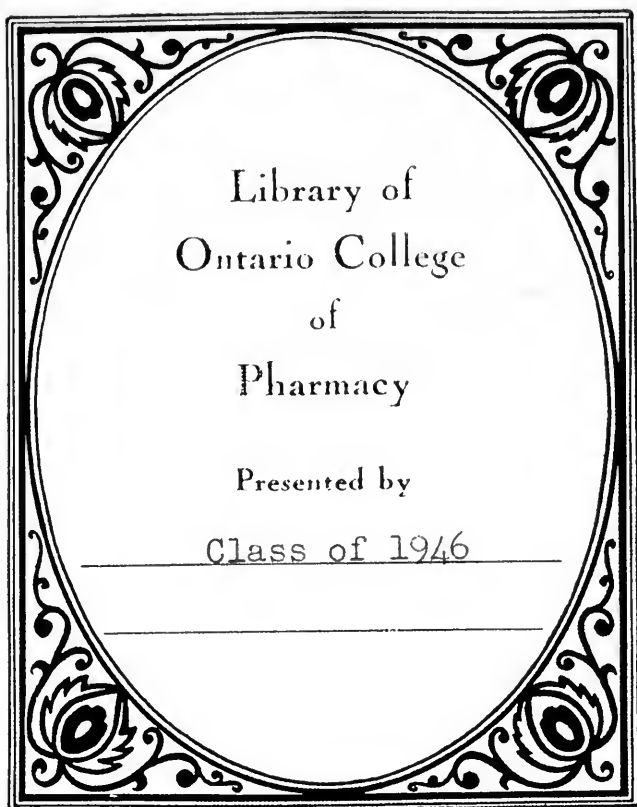


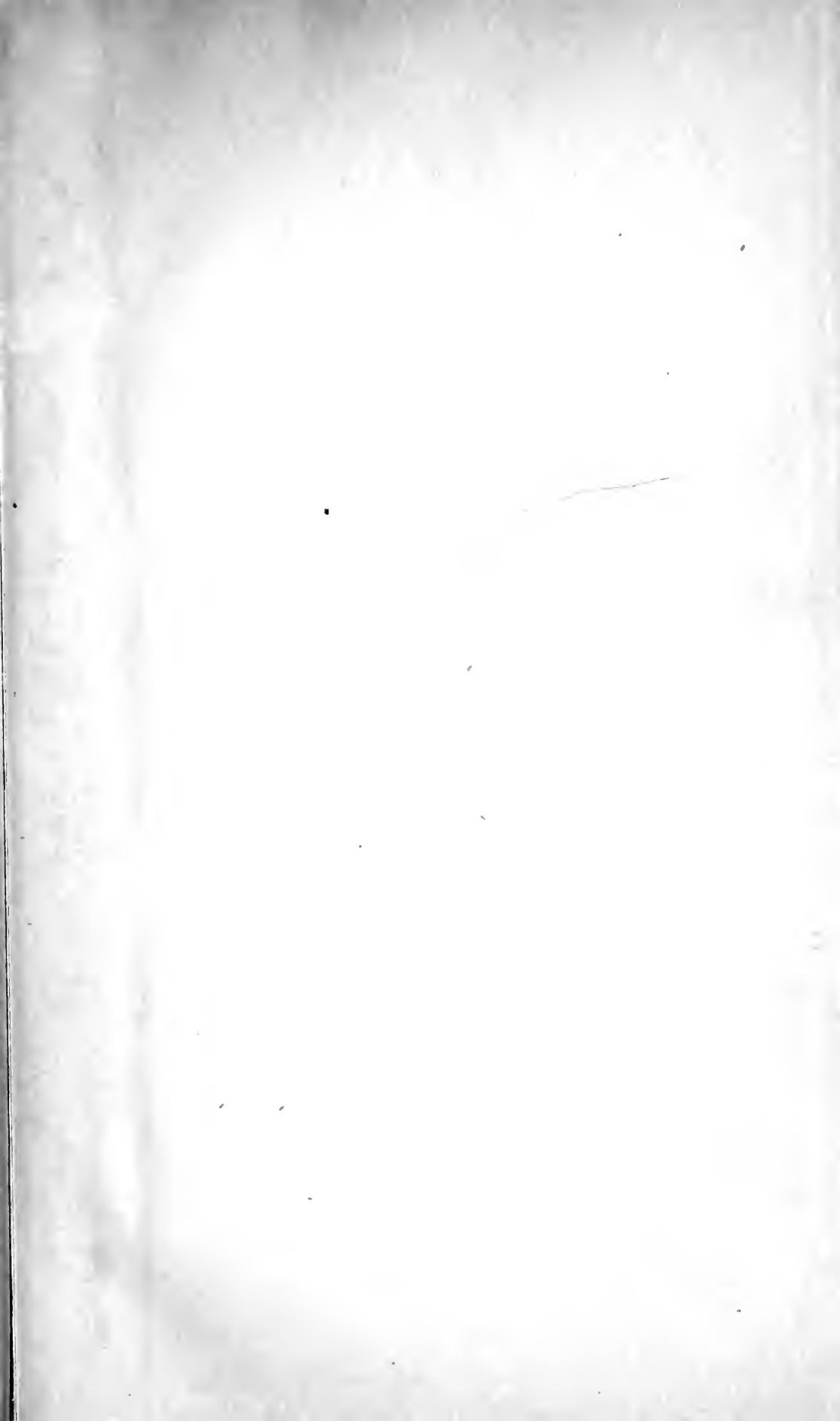


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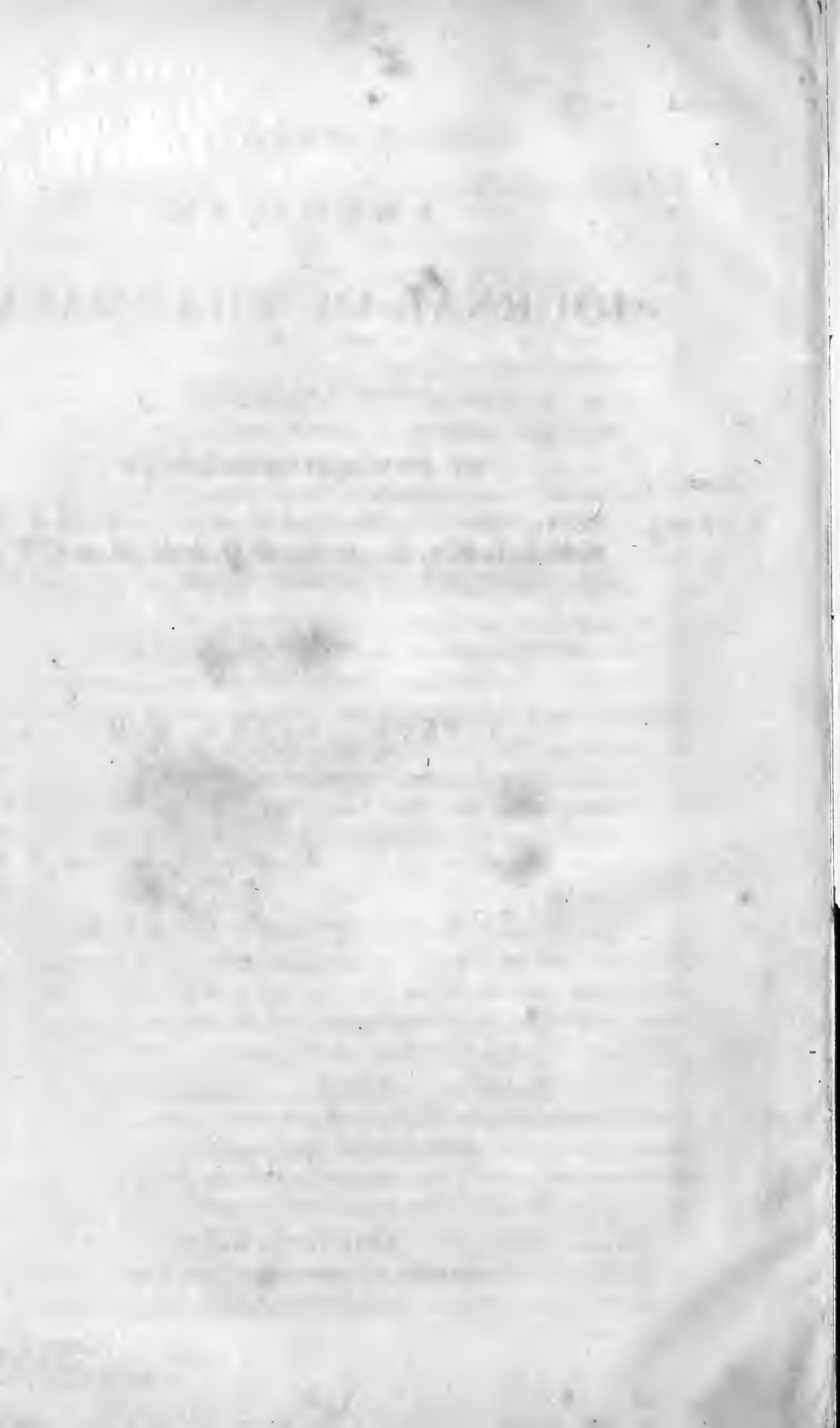
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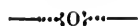
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APRIL, 1836.

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ORIGINAL COMMUNICATIONS.

ART. I.—ON SYMPLOCARPUS FŒTIDUS. By JOSEPH M. TURNER.

(*Extract from Inaugural Thesis.*)

*Nat. Ord.* AROIDEÆ.

*Sex. Syst.* TETRANDIA MONOGYNIA.

**SYMPLOCARPUS.** *Spatha*, ventricose-ovate, acuminate. *Spadix* roundish, covered with hermaphrodite flowers. *Calyx*, deeply four-parted, persistent, segments cucullate, truncate, becoming thick and spongy. *Petals*, none. *Style* pyramidal, four-sided; *stigma*, simple, minute. *Seeds*, solitary, immersed in the spongy receptacle.—NUTTALL.

*S. fœtidus.* *Root* verticillately fibrous, truncate. *Leaves* smooth and green, ovate-cordate, enlarging, protected by large, glaucous, spathulate-linguiform, veinless bractes. *Spatha* ovoid, roundish, cucullate, obliquely acuminate, point coarctate, plaited, involutely auriculate at base, thick and spongy, livid purple, blotched and spotted with pale green. *Spadix* pedunculate, simple, almost spherical. *Bractes*, none. *Flowers* tessellately imbricate, adnate. *Calyx*, four-parted, divided to the base, segments cucullate; compressed at the apex, emarginated, at length becoming very thick. *Petals*, none. *Stamina*, four, opposite the divisions of the calyx; filaments subulate flat; anthers exserted, short, oblong-oval, two-celled; *Germ*, immersed, one-seeded. *Seed* naked, large, round, inclosed in the common receptacle. *Corculum* small, involute, erect, umbilicately attached to a large, solid, carneous perisperm.—NUTTALL.

*Synon.* *Arum Americanum betæ folio.* Catesb. Carol.

*Calla aquatilis odore alii vehemente prædita.* Gron. Virg. 186.

*Dracontium fœtidum.* Lin. Sp. Pl. 1372. Willd. Sp. Pl. 2. p. 288, &c.

*Pothos fetida*. Ait. Hort. Kew. 3. p. 319. Pursh. Flor. Am. Bot. 2. p. 398, &c.

*Pothos putorii*. B. S. Barton. Fl. Virg. Gron.

*Symplocarpus fetidus*. Salisbury. Nuttall. Gen. 1. p. 107. Barton. Mat. Med. U. S. 1. p. 123. Beck. Bot. Northern and Mid. States, 332, &c.

*Ictodes fetidus*. Bigelow. Mat. Med. ii. 41.

*Icon*. Thornton ill. Catesb. Carol. 2. t. 71. Bot. Mag. 836. Barton. Mat. Med. U. S. 1. t. 10.

*Common names*. Skunk cabbage. Skunk weed. Polecat weed. Rich weed. Itch weed.

*Pharm*. Dracontium. U. S. Pharm.

*Offic*. Radix.

*Description*.—*Symplocarpus* is an indigenous, perennial plant, growing very abundantly throughout all the northern section of the United States, in swamps, low meadow grounds, and on the borders of rivulets, delighting greatly in the shade and moisture.

It has caused no little confusion among botanists to arrange this plant, by some being considered as belonging to the genus *Pothos*, and by others, to *Dracontium*, but by most American botanists it has been erected into a new genus, which Mr. NUTTALL calls *Symplocarpus*, after SALISBURY.

This singular plant flowers very early in the season, and may be found as early as February. The flowers are arranged in a globose receptacle, and enveloped in a spathe, beautifully speckled with red, purple, blue, green and yellow; which completely hides the flowers from the inattentive observer.

It may be easily recognized after flowering, by its fine large, bright green leaves, which being all radical, resemble some species of cabbage, at distant view; and also by its very rank and offensive smell when broken, which resembles the odour of garlic and assafoetida combined; or, as its vulgar name would indicate, that offensive animal, the skunk.

All parts of the plant are strongly imbued with this rank odour; but the roots and seeds only are used in medicine.

The root, as generally seen in the shops, consists of the caudex and fibres; the former, when whole, of a cylindrical form, from two to six inches in length, and from one to one

and a half inches in diameter; of a dark brown colour externally, and very rough from the insertion of the radicles; internally of a white, starchy appearance; when cut transversely it shows a medullary portion which is less compact, more of an amylaceous aspect, and shrinks more from drying than the cortical portion.

The radicles are of a much lighter colour than the caudex, about the thickness of a goose quill, and when dried, very much wrinkled; internally of a white colour, with a yellowish brown epidermis; they do not possess the acrid principles of the plant to the same degree as the body of the root, and in fact the specimens which were collected in the fall had scarcely any acidity in them, for which reason they were thrown aside, the caudex alone being used in all the following experiments.

The roots on which these experiments were made, were dug up in the fall after the decay of the leaves, the radicles were cut off, the caudex well rubbed with a soft brush to free it from all foreign matter, then wiped dry with a cloth, and immediately cut into transverse slices about one-fourth of an inch in thickness; then spread out on hair sieves and dried in a well ventilated room; when dry it possessed the fœtid odour, and acrid properties in a high degree; at the time, I thought it had not lost much of its powers by the process, and flattered myself that its active principles might not be as volatile as its family relatives, the *Arum triphyllum*, &c. &c.; but these surmises, as the following experiments will tend to prove, were erroneous.

The decoction of the dried root was, when warm, slightly coloured; when cold and exposed to the light, it assumed a purple tinge, had a slight, sweet, nauseous taste and fœtid odour. It changes the colour of litmus paper.

*Experiment 1.* To the filtered decoction of the root was added a few drops of tincture of iodine, which instantly struck a deep blue colour, indicating the presence of starch.

On the addition of alcohol to the cold infusion of the root, it caused a gelatinous precipitate. Subacetate of lead also pro-

duced a copious precipitate, showing the presence of gum or mucilage.

To a filtered decoction of the fresh root, a small portion of solution of oxalate of ammonia was added, which instantly produced a dense precipitate; oxalate of soda produced analogous effects, showing the presence of lime in a free state, or perhaps as an acetate. The dried root being subjected to the same process, afforded no precipitates, owing, it is supposed, to the lime assuming the form of a carbonate in the drying of the root, and thus becoming insoluble in water.

A portion of the root, on being boiled in water acidulated with nitric acid, gave, on the addition of ferrocyanate of potash, a deep blue precipitate; in the simple decoction no precipitate was observed; thus proving the existence of iron in the form of protoxide. Infusion of galls produced no effect, showing that it must exist in very small proportion.

On the addition of water to the alcoholic tincture, a white flocculent precipitate was caused, indicating the presence of resin.

The alcoholic tincture, made by macerating ʒj. of the root in ʒvj. alcohol of 35° Baumé for two weeks, was of a reddish, yellow colour, fœtid smell, and of a sweetish, nauseous, alliaceous taste, which was much more perceptible when diluted with water; it also slightly coloured litmus red.

The alcoholic extract, obtained by the spontaneous evaporation of the tincture, was of a brown colour, and a sweet, rather acrid taste.

To this extract, water was added, which took up all but a small portion of a tasteless resin and a fixed oil; this aqueous solution when evaporated by means of a water bath to the consistence of an extract, was of a light brown colour, and sweet and bitter taste, like that of peach kernels.

The etherial tincture, made by the action of ʒij. sulphuric ether on ʒss. of the root for two weeks, when filtered, was of a bright, golden yellow colour, and reddened litmus paper. Set aside this tincture for spontaneous evaporation; the result was, an extract of a dark brown colour and narcotic smell,

which consisted of a fixed oil soluble in alcohol, and wax with some colouring matter; the oil was tasteless, but the dark colouring matter, which was also soluble in alcohol, had a slight, peculiar taste.

One ounce of the powdered root, was submitted to the action of ℥vj. of a menstruum, composed of 4 parts of hydrochloric acid, to 100 parts of water. This tincture was of a dark, wine red colour.

The addition of oxalate of ammonia caused a very abundant white precipitate, showing the existence of lime, and establishes the view before taken of its assuming the form of carbonate in the drying of the root; this being converted into a muriate by the acid, is then precipitated as an oxalate, by the above named test.

Ferrocyanate of potash, caused a blue precipitate; but the infusion of galls none.

The pure hydrochloric acid was tested for iron, of which it contained scarce a trace, whereas the dilute muriatic tincture gave a very deep blue precipitate.

The surface of a slice of the root was removed by means of a piece of glass, that the root having been cut with a metallic knife might not affect the experiment; it was then moistened with dilute nitric acid, and a drop of solution of ferrocyanate of potash was applied, which gave a greenish blue tint. The iron exists in such small quantity as not to be detected by gallic acid, but the ferrocyanate acts, from being a much more delicate test.

The infusion, made with warm water, contains more of the peculiar properties of the root than any other preparation; it is of a sweetish, bitter taste, leaving, on being drank, an acrid sensation, like tobacco on the fauces.

An infusion of the coarsely bruised root was made, which was very mucilaginous; alcohol was added to precipitate part of the mucilage; the liquid filtered, which was nearly colourless, (it smelled much stronger after the addition of the alcohol than before) to some of the filtered liquor, was added aqua ammonia; which instantly changed it to a light red colour; on

standing it became much deeper, and in the course of twenty-four hours deposited a blackish purple substance, which was separated by filter; it was encumbered by a large quantity of mucilage, and when pressed between the teeth was gritty, but there was so small a quantity of the precipitate, that no experiments could be pursued on it.

An infusion was also made from which the mucilage was precipitated by subacetate of lead; the excess of lead by sulphuretted hydrogen, and ammonia added to the filtered liquid, which gave no satisfactory results.

One thousand grains of the finely bruised root were subjected to the action of  $\text{℥xij}$ . distilled vinegar of the specific gravity 1.007 for the space of four weeks, being frequently shaken in the interval; the ingredients were submitted to strong pressure, and the liquid when filtered, was of a bright yellow colour, of specific gravity 1.0405, possessing the foetid smell of the plant in a high degree.

To this clear filtered solution, subacetate of lead was added so long as any precipitate fell, thus separating any mucilage that might be present; after the separation of this precipitate by the filter, a solution of oxalate of ammonia was added to throw down any excess of lead, as well as lime, that might be present in the solution taken up from the root by the acetic acid; the insoluble oxalates of lead, and lime, were separated by means of a filter, the liquor still retaining its yellow colour. Aqua ammonia was now added, to neutralize the acetic acid; this changed the liquid to a light purple colour; this purple solution was set aside for twenty-four hours, in which time a blackish purple substance was deposited on the bottom and sides of the precipitating glass, the dark coloured liquor was drawn off by a capillary siphon, the remaining portion separated by a filter; this substance was washed with pure water to separate any acetate of ammonia, filtered, and dried with bibulous paper. The precipitate amounted to but four grains; it was of a blackish colour, and granular appearance, insoluble in ether, alcohol or water, but slightly soluble in any of the acids—no taste, perhaps owing to its insolubility; yielding

under the teeth like wax; on being macerated in dilute nitric acid it changed to a brown colour. The purple liquor before depositing all of this substance, is changed by the addition of nitric acid, to a bright red colour; by sulphuric acid, to a turbid red; and by hydrochloric acid to a straw yellow colour.

The acid solutions of this substance are precipitated by alkalies.

On adding a fresh portion of aqua ammonia to the coloured liquid, and setting aside for twelve hours, a further precipitate was obtained, but not in sufficient quantity for experimental purposes. On this substance being exposed to heat, it changes from black to brown; it is probably some peculiar principle of the plant combined with ammonia.

A portion of the root was placed in a retort, enough water added to cover it, and heat gradually applied by means of a spirit lamp, till it reached the boiling point; the water, which was collected in a globose receiver, was redistilled from fresh portions of the root till it came over milky, but no distinct particles of oil were observed; the distilled liquor had some of the odour, but none of the acrimony of the root.

Supposing that possibly the acrid properties of the root might depend on a gaseous principle, an attempt to obtain such gas was made by boiling a portion of the root in a retort, the boiling point being raised by chloride of sodium; when all the atmospheric air was driven off, the vapour was passed through water, and a small portion of gas was obtained, not inflammable, but of a disagreeable smell; also a concrete, oleagenous substance came over and collected on the sides of the receiver, which was tasteless.

A quantity of the root after having been macerated in ether and alcohol, was subjected to the action of a solution of potassa, and then to dilute hydrochloric acid, which left a substance having the properties of lignin.

A portion of the root was incinerated, the product lixiviated with pure water, the solution filtered; it changed infusion of turmeric, brown; this solution was neutralized by nitric acid, and on evaporation yielded crystals of nitrate of potash.

The insoluble residue was dissolved with effervescence by muriatic acid; this solution gave a precipitate on the addition of oxalate of soda, and with ferrocyanate of potash a blue precipitate.

The best mode of preparing this root is, to immediately cut it into transverse slices, about one-fourth of an inch in thickness, in order to dry it as speedily as possible at the common atmospheric temperature in the shade; as soon as completely dried it should be kept in close stopped bottles, carefully secluded from the light, which appears to have as great a deteriorating effect on it as exposure to the air; it should never be powdered except immediately before being used, as in this state it more rapidly loses its peculiar virtues, and becomes wholly inert.

The following are presumed to be the chief constituents of this root, judging from the preceding experiments, viz:

Starch, gum, resin, saccharine matter, a fixed oil, a volatile fatty matter, volatile oil, wax, colouring matter, a peculiar substance soluble in acids, and precipitated by alkalies, lignin, protoxide of iron, and salts of lime and potassa.

**SEEDS.**—The *Symplocarpus* perfects its seeds about the latter end of September, or beginning of October; they are of various shapes and sizes, some of them roundish, others very much flattened and angular, with the hilum strongly marked; they vary in size from a coriander to that of a hazel nut; of an umber colour externally, with the interior portion of a fleshy consistence, and blueish white colour, sometimes yellowish; when rubbed between the fingers of an unctuous feel in the fresh state, but when dried not so much so; on being cut and drawn across paper they leave an oily trace, which is not volatile; at first they are of a sweetish, rich taste; but on being chewed for a short time create a most intolerable prickling sensation on the tongue, which is very permanent, and followed by a sense of soreness of the mouth.

In the whole state they have no smell, but on being bruised they give out all the peculiar alliaceous odour of the plant



which is possessed by them in as great abundance as any other part, and the acrimony in a much greater proportion.

The seeds on which the following experiments are founded, were collected in the beginning of November on the site of the decayed plant; they were found in clusters of from twenty to thirty each, but owing to the quantities of fallen leaves at this time there was some difficulty in detecting them.

They ought to be collected about the middle of October, as at this time they may be easily procured in large quantities where the plant abounds, its black decayed pericarp readily discovering it to one in the least acquainted with its mode of growth.

A decoction of the seeds was made with boiling water; a portion of this, on being filtered, formed a blue compound with tincture of iodine.

Alcohol on being added to the filtered cold infusion, caused a gelatinous precipitate; subacetate of lead also gave a precipitate.

On adding water to the alcoholic tincture a turbidness ensued, showing the presence of resin.

A portion of the seeds were beat in a mortar, with water, forming a milky emulsion; on drinking a small portion of this, it was similar to that of almonds in taste, but leaving an acrid sensation in the throat somewhat like *Polygala senega*. When this remedy is used, would not this be a good mode of administering it? as when prepared in the same way as emulsion of almonds, it is equally palatable, has all the bulk of the seeds, and consequently their properties; it has, however, one objection, it spoils rapidly.

Some of this emulsion was filtered; into the clear liquid was dropped some solution of bichloride of mercury, which gave a white precipitate; infusion of galls had a similar effect; ferrocyanate of potash also, when added to the liquor, slightly acidulated with acetic acid, gave a white precipitate, also the following metallic salts: subacetate of lead, sulphate of iron, nitrate of silver, &c. &c.; on boiling, the liquor became opalescent; these tests prove the presence of albumen.

The alcoholic tincture made with  $\text{zij.}$  of the seeds finely sliced, to  $\text{ziv.}$  of alcohol, was of a light yellow colour, and possessed their peculiar smell.

The extract, prepared from this tincture, was of a light brown colour, consisting chiefly of resin, and a small portion of fixed oil; the resin is rather acrid; this extract had none of the sweet taste of that of the root.

Some of the finely bruised seeds were subjected to the action of sulphuric ether for two weeks; this tincture, after filtering, was of a bright golden yellow colour; set it aside to evaporate spontaneously, during which a yellow oily fluid was deposited, and after the total evaporation of the ether, a black oily fluid was left floating on the surface of the previously deposited oil; this was of an acrid, peppery taste, soluble in alcohol, excepting a whitish flocculent substance, which on examination, proved to be wax.

The fixed oil has a rich, nutty taste, similar to oil of shell-bark, and without any acrimony; it is lighter than water, leaves a greasy stain on paper which is not dissipated by heat; it is but slightly soluble in alcohol; the quantity contained in the seeds is very great, 100 parts of the seeds yielding 20 parts of pure oil.

From the preceding experiments the following appear to be the chief constituents of these seeds:

Starch, gum, resin, albumen, a fixed oil, wax and colouring matter.

## ART. II.—PHARMACEUTICAL NOTICES. No. XIII.

*Nitro-sulphate of Ammonia.*—In our last number, we gave a brief notice of the good effects that had been derived from the administration of nitro-sulphate of ammonia in typhoid fevers; without, however, stating the process by which this article is to be made. As several inquiries have been made on the subject, we subjoin the following, derived from the *Journal de Pharmacie* for August last. At a meeting of the Academy of Sciences of Paris, held on the 20th July, M. J. PELOUZE read a memoir on some combinations of a new acid, formed of nitrogen, sulphur and oxygen, the results of which were:

That on subjecting a mixture of sulphite of potassa, soda or ammonia, and of deutoxide of nitrogen to a temperature of about  $0^{\circ}$  F., these two bodies completely disappear, giving rise to new salts, having for their formula:  $Ko\ Az^2\ So^4\ NaO\ Az^2$ ,  $So^4\ H^6\ Az^2\ Az^2\ So^4 + H^2\ O$ . These salts crystallise with great facility. They have this peculiarity, that most substances which decompose oxygenated water, also decompose them; without, however, adding or taking away any thing.

The alkalies augment the stability of these salts which M. PELOUZE has called nitro-sulphates, and completely prevent the action of spongy platina, silver, powdered charcoal, and other agents which decompose a solution of the nitro-sulphates in an uncombined form.

The nitro-sulphates may be readily obtained, by passing a current of deutoxide of nitrogen for several hours through a sulphite dissolved in highly alkaline water. M. PELOUZE was unable to prepare nitro-sulphuric acid, without the aid of bases.

*Phosphate of Quinia.*—Many physicians in Europe prefer the phosphate of quinia to the sulphate; as, in their opinion, it

agrees better with irritable stomachs, and where there is a tendency to, or inflammation of the internal organs. It does not, it is said, produce the uneasiness which sometimes follows the use of the sulphate, as it acts in a less direct manner on the organs of respiration and circulation.

Several modes of preparing it have been advised, but the best results are stated to have been obtained by the following process recommended by WINKLER in BUCKNER. *Repert Pharm.*

Triturate crystallised sulphate of quinia 480 parts, with crystallised hydrochlorate of barytes 1200 parts, add 8 parts of distilled water, filter, wash the residue well, unite the filtered solution and washings, adding 4 parts more of distilled water; to this a dilute solution of phosphate of ammonia is to be very gradually added, and at intervals, stirring continually, till a precipitate is no longer produced. The whole is now to be filtered, and the residue rapidly washed with cold distilled water, and dried by a gentle heat. An excess of the phosphate is to be avoided, or part of the precipitate will be redissolved. By this mode of preparation 46 parts of phosphate of quinia are obtained for every 60 parts of the sulphate employed. It is in a fine crystalline powder, of a brilliant white colour, very light, and of an extremely bitter taste. It is soluble in 480 parts of warm, and 140 of cold water.

*Unguentum hydrargyri oxidi rubri.*—This ointment is very often badly prepared, and hence disappoints the expectations of the physician. When used for the cure of certain diseases of the eye it is of the utmost importance that it should be completely homogenous, and free from visible particles of the oxide. The best directions for its preparation are those given by Mr. THOMAS CLARKE, in the *Glasgow Medical Journal*. He says, to attain a proper consistence in the ointment, to keep it from spoiling, to obtain a strength readily computed, and to render it uniform and certain, are the great desiderata. For this purpose he proposes the following formula. Take of red precipitate, prepared by nitric acid, good

yellow wax, of each a drachm; prepared lard, an ounce. Rub the red precipitate till it becomes of a uniform orange colour; then mix it with a little of the lard. Mix also the remainder of the lard with the wax and melt them together. When the latter mixture is removed from the fire and has begun to harden, add it to the former, and stir the whole till perfectly cool. In rubbing down the precipitate the utmost care must be taken that this process be continued till it is perfectly impalpable; hence not more than a drachm should be operated on at a time.

*Unguentum Cantharidis.*—Various formulæ are given in the different Dispensatories and Pharmacopœias for this preparation, some of which are efficient, and fulfil their intention in every particular, whilst others betray a striking want of pharmaceutic knowledge on the part of their proposers. The following, which is recommended by Dr. T. MARTIN, is said to afford many advantages, as it spreads easily, adheres well, and is not liable to deteriorate by keeping.

Four ounces of powdered cantharides are to be infused in twenty ounces of boiling water, and macerated for twelve hours; strain and evaporate by a gentle heat to the consistence of a syrup. Add yellow wax four ounces, resin, olive oil, and spirits of turpentine each one ounce, alcohol two ounces; the whole to be thoroughly incorporated by stirring. If this ointment is required of a greater strength, a larger proportion of cantharides may be used.

*Senna and Prunes.*—A common domestic aperient is prepared by stewing prunes with senna; this, in most cases, answers the purpose very well, but the taste of the senna is not always sufficiently disguised, added to which, to obtain the desired laxative effect, so large a quantity of the prunes are obliged to be eaten, as to oppress the stomach and bowels. The following mode of preparation has been found very effectual, and of an agreeable taste. Senna leaves half an ounce; supertartrate of potash half a drachm; water half a

pint, boil gently for ten minutes and strain. To the strained fluid add half an ounce of sugar and half a pound of prunes, and simmer till the fruit has absorbed the liquid.

*Artificial Musk.* This article, which is seldom to be found properly prepared, and from too generally disappointing the practitioner, is but little employed;—when good forms a most admirable substitute for the genuine musk, and in fact, it is far superior to the adulterated article so commonly sold as the real Chinese. Dr. S. W. WILLIAMS, who communicated a highly interesting paper on the subject to the *Boston Med. and Surg. Journal*, speaks of it in the most exalted terms in the treatment of whooping cough, typhoid states of fever, and all the nervous affections. He also states that combined with aqua ammonia, compound spirits of lavender or laudanum, according to circumstances, he has found no remedy so efficient in those attacks of sinking faintness so often present in the last stages of pulmonary consumption, especially when there is distressing dyspnœa and violent palpitation of the heart.

Dr. WILLIAMS says that the preparation he employs, is made according to the following formula. Three drachms and a half of concentrated nitric acid are to be very gradually dropped on one drachm of rectified oil of amber contained in a glass tumbler, or very large wine glass. This mixture, when agitated, grows hot, and emits offensive fumes, which the operator must avoid inhaling. He also adds, that as the acid generally to be met with is not of sufficient strength to produce the proper reaction without the assistance of heat, he usually after mixing the ingredients, places the vessel containing them on an earthen plate, before the fire, until it becomes hot, continually stirring with a glass rod; the reaction is sometimes so rapid and violent as to eject parts of the contents from the glass; hence the use of the plate beneath.

After the mixture has remained at rest for twenty-four hours, it acquires a resinous appearance, and divides into two portions, the lower of which is an acid fluid, and the upper a

yellow resin resembling musk in its smell. This is to be thoroughly washed, first in cold and then in hot water, till all traces of acid are removed.

This article may be employed in emulsion, as is recommended by HUFELAND, made by triturating ten or twelve grains with a few almonds, and adding five or six ounces of water. The dose of this is two tea spoonsful for a child of two years of age. The usual mode of administering it, however, is in tincture, made by dissolving two drachms in eight ounces of alcohol. The dose is twenty-five drops.

R. E. G.

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ART. III.—ON SOLANUM DULCAMARA. By JOHN W. SIMES.

(*Extract from Inaugural Thesis.*)

It flourishes profusely in damp and sheltered situations, as on the banks of streams and among the thickets which border our natural meadows. In the United States it extends from New England to Ohio. Its flowering period is from June to August.

The roots and stalk, upon being chewed, first cause a sensation of bitterness, which is soon followed by a considerable degree of sweetness; and hence, the plant obtained the name of *Bitter-sweet*.

The berries have not been applied to medical use; they seem to act powerfully on the primæ viæ, exciting violent vomiting and purging.

The officinal parts of the plant are the stalks and the extreme branches; they should not be of more than one year's growth, and should be gathered in autumn after the fall of the leaves, as the sensible qualities of the plant are then said to be the strongest; in the whole state it is inodorous, but when bruised it emits a peculiar and rather nauseous smell.

“Dulcamara possesses narcotic properties, with the power of increasing the secretions, particularly that of the kidneys and skin. Its narcotic effects do not become obvious unless when it is taken in large quantities. In over doses it produces nausea, vomiting, faintness, vertigo and convulsive muscular movements. It has been recommended in various diseases, but is now nearly confined to the treatment of cutaneous eruptions, particularly those of a sealy character, as lepra, herpes, &c. &c. It is said to be beneficially employed in chronic rheumatism.”

MM. BRAULT and POGGIALE, of Germany, from some late experiments they have made on hyoscyamus and digitalis, have come to the conclusion that many of the vegetable alkaloids, as hyoscyamia, conia, digitalia, atropia, &c. are nothing more than salts of the alkaline earths, and that the virtues and effects which have been attributed to them have been owing to more or less of the active principles of the plant being mixed or combined with them, as is the case with piperine, the activity of which is generally acknowledged to depend upon the quantity of oil of pepper combined with it. The experiments which I have made on the article, under consideration, would seem to lead to similar conclusions.

*Experiment, No. 1.* ℥viiij. of the bruised twigs of the dulcamara were boiled in six pints of water down to three pints. To the filtered decoction were added (while hot) ℥iij. of magnesia. It was then set aside with occasional agitation for twenty-four hours, filtered, and the precipitate collected and submitted to the action of boiling alcohol fort. for five minutes, filtered; removed the colouring matter by animal charcoal; filtered and set it aside for deposition, but none took place. On evaporating the supernatant liquor there was left a few grains of a yellowish resinous mass, which had very little of the properties of the plant. The liquor filtered from the magnesia was evaporated to the consistence of an extract, which evidently contained most of the virtues of dulcamara, as on taking a small quantity of it, nausea and headache were produced; in this solution there was no alkaline reaction on test paper.



The above was repeated several times with slight variations, with similar results.

*Experiment, No. 2.*—Repeated No. 1, except f. ʒi. aqua ammoniæ, fort. was added to the decoction instead of the magnesia; this produced a flocculent precipitate; collected on a filter, and boiled it in alcohol, fort. for five minutes; the alcohol took up most of the precipitate, leaving a small quantity of a whitish granular powder, which was insoluble in alcohol, ether, water, and boiling oils, and perfectly fixed in temperatures raised to redness; this evidently was a salt of one of the fixed alkaline earths; after decolourising, the alcohol poured from off the above powder, was set aside for spontaneous evaporation; but nothing was thrown down, leaving a residue similar to experiment No. 1.

*Experiment, No. 3.*—Made a decoction as in No. 1, to which was added a solution of subacetate of lead, as long as any precipitate was formed. Hydrosulphuric acid was then passed through the mixture, as long as precipitation continued; filtered and boiled the filtered solution; then added ʒiij. of magnesia; boiled for five minutes; collected the precipitate on a filter; submitted it for five minutes to boiling alcohol, fort.; filtered and set it aside; but in the result there was nothing satisfactory.

*Experiment, No. 4.*—No. 1 was repeated, except alcohol as the solvent was employed, through the whole process, but no trace of an alkali was at all discernible.

*Experiment, No. 5.*—A decoction as in No. 1, was made, except in using diluted alcohol as a menstruum. In the first stage of the process, the results were similar, except the decoctions had, in a much higher degree, the sensible properties of the dulcamara, than when either water or alcohol alone were employed. From this, it may fairly be asserted, that diluted alcohol is the proper solvent for dulcamara.

I tried a great many processes somewhat similar to the foregoing, and in none of them was there the slightest trace of a vegetable alkaloid discovered by test or perception.

In a decoction of dulcamara, a solution of gelatin produces

a yellowish flocculent precipitate; a solution of protosulphate of iron, a black flocculent precipitate; and a solution of nitrate of silver, a whitish precipitate, which becomes grey on standing; solutions of the tartrate of antimony and potassa, hydrate of potassa, bichloride of mercury and tincture of iodine have no effect on it.

The only officinal form of administration of dulcamara, is that of the decoction, which is made by boiling ℥j. of dulcamara in one and a half pints of water to one pint strained, and taken in doses of f. ℥ij. each.

A tincture was made by digesting ℥iv. of dulcamara in two pints of diluted alcohol in a warm temperature (occasionally putting it for a short time in a water bath,) for 14 days, and filtering. This produces a tincture of a yellowish-red colour, tasting very similar to the plant; the dose of this tincture is f. ℥j.

But a much better form of administration than either of the above, is the extract; the decoction is very frequently inactive on account of the liability of the twigs to deteriorate by keeping, and the tincture would be objectionable in many cases on account of the stimulating properties of the menstruum used in preparing it, while the extract can have none of these objections, if prepared from the twigs when first collected, and the practitioner can (when it is properly prepared) depend upon having a medicine of uniform strength.

The following is the recipe for preparing the extract:

<b>R</b> Dulcamara, (recently dried twigs, bruised)	℥viiij
Diluted alcohol	iv. pints. M.

Digest in a water bath, (low temperature) for fourteen days, express, filter, and evaporate in a water bath to a proper pillular consistence, yields 384 grains of a brownish-red coloured extract possessing, in a marked degree, the properties of the plant, producing severe headache, nausea and giddiness. The dose of it is from six to eight grains, repeated at proper intervals.

## ART. IV.—MEDICO-BOTANICAL NOTICES. No. IX.

*Dioscorea villosa*.—This plant, which in some parts of the country is known under the name of *wild yarn*, unlike the cultivated species, has a woody and contorted root, which, according to Mr. RIDDELL, (*Synop. Flora. West. States*) is possessed of valuable medical properties. He states, that a decoction prepared with it is unquestionably a highly useful remedy in bilious colic. This decoction is made by boiling an ounce of the powdered root in a pint of water, and half of which is to be administered at a time. He says that it acts with remarkable promptitude, and adds, that he has been informed that Dr. NEVILLE, of Ohio, places much reliance on the tincture as an expectorant; it also acts as a diaphoretic, and in large doses as an emetic.

*Cocculus Indicus*.—Within a very few years, the science of medical botany has done much in the elucidation of the origin of various articles of the vegetable materia medica. Thus, to Mr. DON we are indebted for a knowledge of the plants furnishing galbanum and ammoniac; to Dr. COXE, for a settlement of the vexed question of the species of plant producing jalap; and to Mr. HANCOCK, for the light he has thrown on the subject of several important articles derived from South America, &c. &c. Notwithstanding, however, the number and value of these discoveries, this part of pharmacology is still in a very unsettled and confused condition, and offers a wide field for the labours of botanists.

Among those articles involved in uncertainty and doubt, was the *Cocculus indicus*. M. A. RICHARD, however, in a short notice, published about the commencement of last year, has very satisfactorily removed the obscurity that existed with regard to its origin and species furnishing it.

He observes, that LINNÆUS referred it to the genus *Menispermum*, under the name of *M. cocculus* DECANDOLLE

divided this genus, and on a certain number of species erected that of *Cocculus*, including the article under consideration, to which he gave the name of *C. suberosus*. Recently Dr. ARNOTT, in his *Prodromus* of the flora of India, has described the male plant of this species, and has shown that it has been already noticed under a variety of names. Thus it is the *Menispermum monadelphum* of the drawings of ROXBURGH, (No. 130) in the collection at the East India House; and the *M. heteroclitum*, ROXBURGH and WALLICH (*Flora Indica*, iii. 817); finally, it is identical with the plant described by COLEBROOKE, (xiii. *Transactions Lin. Soc.*) under the name of *Anamirta racemosa*.

Dr. ARNOTT also states that it is evidently of the same species as the female plants, known under the names of *M. cocculus*, L., and *C. suberosus*, D. C. But as from the structure of its male flowers it cannot belong to either of these genera, he has adopted that of COLEBROOKE, and given this species the name of *Anamirta cocculus*. Its synonymy, therefore, is as follows: *Anamirta cocculus*. WHITE and ARNOTT, *Prod. Flor. Penins. Ind.* occ. 449. *A. racemosa*, COLEBROOKE. *Trans. Lin. Soc.* xiii. 66. *Menispermum cocculus*. LINNÆUS, GÆRTNER, t. 70, f. 7. ROXBURGH. *Flor. Ind.* iii. *M. heteroclitum*, ROXBURGH, l. c. *M. monadelphum*, ROXBURGH, *Cat. et icon*, 130. *Cocculus suberosus*, DECANDOLLE, *Prod. et Syst.*

*Hibiscus esculentus*.—This plant, the fruit of which is so well known as an esculent vegetable, under the name of okra, deserves more notice as a demulcent than it has received. The whole plant, like most of the malvaceæ, is mucilaginous; more especially the pods, which in an immature state, are an excellent substitute for the *Althæa officinalis*, and form a very appropriate article of diet in diseases of the bowels, by simply boiling them in water. As generally eaten, however, in the form of *gombo* and *colalou* from the admixture of stimulants, they are a highly stimulating food.

The ripe seed also forms a good substitute for coffee, or

rather is an advantageous addition to this article, as the decoction prepared from the mixture, although having the flavour and aroma of the coffee, does not cause that excitement of the brain and nervous system, so often produced by the foreign berry.

The mode of preparing this for use is thus given by Mr. ICARD, (*Journ. de Chim. Med.* Jan. 1835.) An equal quantity of coffee and of okra seeds perfectly dry, are to be measured out; the coffee is to be introduced into a roaster and when about half burned, the okra seeds added to it, and the process continued till the latter are heard to crackle. By this plan the okra seeds become completely imbued with the aroma of the coffee. Care must be taken that they are not too long subjected to the action of the heat; when they have assumed a bright chestnut colour, they should be removed. The mixture is then to be ground, and used in the same proportions as pure coffee.

*Simaruba.* The first account of the Simaruba, is, that some of the bark was sent to Europe in 1713 by the Count of PORCHARTRAIN, as an article used by the natives with signal success in the cure of diseases of the bowels. In 1741, but little additional information, it would appear, had been acquired respecting it, as GEOFFROY (*Mat. Med.*) in speaking of it, says: “est cortex radicis arboris ignotæ in Guiana nascentis, et ab incolis Simaruba nuncupatæ.” JUSSIEU, however, used it with benefit in 1718, in an epidemic dysentery then prevalent in Paris.

In 1753, LINNÆUS, who at that time had not seen specimens of the tree, ascribed it to a species of *Pistacia*, or the *Terebinthus major betulæ cortice fructu triangulari*, SLOAN, (*Jam.* 289, t. 99.) In 1756, BROWNE, (*Civil and Nat. Hist. Jam.* 345,) describes a terebinthus, or turpentine tree, the roots of which he was of opinion furnished the Simaruba bark.

In 1763 LINNÆUS had changed his opinion as regarded the origin of this bark, and stated that it was furnished by the *Bursera gummifera*, referring however to the *Pistacia* of

former editions and to BROWNE and SLOANE, and in his appendix also to *Terebinthus Americana polyphylla*, COMMELIN. Hort. I. 149, and to the *Gum elemi* tree of CATESBY. On the visit paid by JACQUIN to the West Indies some years afterwards, he examined the roots of this *Bursera*, and found that they furnished a bark differing widely from the *Simaruba*.

In 1773, Dr. WRIGHT, who paid much attention to the plants of Jamaica during his residence there, found on examination that it was derived from a species of *Quassia*, and under this name sent specimens of the fructification preserved in spirits, to Dr. HOPE, Professor of Botany at Edinburgh, accompanied with the bark of the roots. The following year he also transmitted analogous specimens to Dr. FOTHERGILL of London, by whom they were communicated to LINNÆUS, who acknowledged the correctness of Dr. WRIGHT's observations by adopting this name in the *Supplement* to his *Syst. Veg.*

Dr. WRIGHT, from whose paper in the *Transactions Royal Soc. Edinburgh*, ii. 73, much of the above is derived, states that in Jamaica, this tree is universally diœcious, though most modern botanists are of opinion that it is polygamous. The synonymy of this species appears to be as follows. *Quassia simaruba*, LIN. Supplem. 234. WILLD. Spec. ii. 568. POIRET. Dict. Method. vi. 25. LAMARCK. Illustrat. t. 343, f. 2. WOODVILLE. Med. Bot. ii. p. 211, t. 76. *Simarouba*. AUBLET, Act. Paris. 1776. *Simarouba amara*. AUBL. Guian. ii. 859, t. 331, 332? *S. officinalis*. DECANDOLLE. Syst. S. *Guyanensis*. RICHARD. Elem. Hist. Nat. ii. 786, &c.

R. E. G.

## ART. V.—ON HYPERICUM PERFORATUM.

BY HENRY C. BLAIR.

*(Extract from Inaugural Thesis.)*

THE root of the *Hypericum perforatum* is perennial, fusiform, sometimes spiral, from three to six inches in length, and two or three lines in thickness, sending off a number of horizontal radicles about a line in thickness, which are frequently much distorted. The recent root is of a light yellow colour, which becomes brown by drying. It consists of a thin cortical, and an internal white, very brittle ligneous portion. The stalk of the plant is from one to two feet in height, (generally about eighteen inches,) straight and erect, except the lower section, which is considerably curved. It is ligneous, and is covered with a thin membranous bark, of a dark brown colour, which may be easily separated from it. It sometimes embraces at its junction with the root, the remains of the stalk of a preceding year. Not unfrequently, two or three stems arise from the same root. The upper branches are opposite and alternate, the interval between each pair being about one inch. In other respects they resemble the stalk. The lower or radical branches differ, in their being vine-like and herbaceous. The leaves are six or eight lines in length, opposite and alternate, oval, oblong, obtuse, nerved, sessile, and entire. Their colour is light green, and on being held up to the light, numerous small transparencies, resembling punctures, may be perceived, from which characteristic the specific name of the plant is derived. The flowers are arranged in a terminal corymb. They are of a bright yellow colour, and consist of a calyx, which is divided into five equal parts, and a five petaled corolla, enclosing numerous stamina. The root of the St. John's Wort, on being well bruised, and digested in official alcohol for six or eight days, yields a light yellow tincture, which, when evaporated to the consistence of syrup, and suf-

ferred to cool, separates into two distinct substances. The first is of a dark brown colour, very adhesive, insoluble in water, but soluble in alcohol and ether. Its taste is warm and aromatic, resembling that of the oil of black pepper, but in an inferior degree. Its odour has also some resemblance to that of the same principle. When dissolved in a small portion of alcohol, it imparts to that menstruum a greenish cast. Its solution is not affected by the addition of a solution of gelatin or sulphate of iron. The second substance produced is of a red colour, brittle, inodorous, slightly soluble in alcohol and in ether, but very soluble in water. Its solution is of a brownish cast, but on the addition of a solution of the sulphate of iron, it is converted to a deep blue. A solution of gelatin forms with it a precipitate.

The same portion of root acted on by the alcohol, was digested for some days in water, and the infusion filtered. This infusion was not affected by the addition of a solution of iodine, alcohol, or a solution of the subacetate of lead; but a precipitate was formed on the addition of a solution of gelatin. The leaves and the flowers impart to water by decoction, and to alcohol and olive oil by maceration, a deep red colour. The decoction is precipitated by a solution of gelatin, and of the sulphate of iron; but is not affected by the solution of iodine, or of the subacetate of lead. Carefully evaporated, it yields an extract having an odour much resembling that of the horehound. The tincture carefully evaporated, yields two substances precisely resembling those obtained by the same process from the tincture of the root, but in a much larger proportion. The oleaginous infusion acquires, besides its red colour, a slight acrimony, which is perceptible on a drop or two of it being placed on the tongue. I have perused several writers on the materia medica, who have treated concisely of the *H. perforatum*, and the majority of them agree in attributing its therapeutical agency to the presence of a volatile oil, contained in small vesicles, attached to the leaves and the petals of the corolla. No accurate description, however, is given by them of this oil, or of the amount afforded by a defi-



nite quantity of those parts of the plant said to contain it. I attempted to procure some of this principle by distillation, but failed in the experiment, and in consequence of my supply of the herb being small, I was obliged to abandon further proceedings. The only evidence I had of the presence of a volatile oil in this plant was, that when a branch of it was immersed in a vessel containing water heated nearly to the boiling point, a thin stratum of a volatile substance was evident, floating on its surface, the whole presenting such an appearance as it otherwise would have done, had a drop of one of the ordinary essential oils been substituted for the branch of *Hypericum*. From the several experiments just described I think it is reasonable to suppose, that the only proximate principles of importance contained in the *St. John's Wort*, are an acrid resinous substance, probably a small portion of volatile oil, tannin, and a red colouring matter. To the first of these it is probable the plant owes, in a great measure, its medical virtue.

*St. John's Wort* has been employed as a therapeutic agent as long since as the time of Hippocrates. Like many other medicines of long standing, at different periods different opinions were entertained of its efficacy. At one time, its virtues were the subject of the highest encomium; again it was regarded as almost or entirely inert; and again, it was introduced, and acquired celebrity, so that we are almost induced to believe it to be of but little, if of any, importance. Some of the ancient practitioners, however, formed a high estimate of its importance in the treatment of those afflicted with mental derangement and epilepsy.

It is said to be possessed of anthelmintic and diuretic properties. Dr. Cullen, in treating of this medicine, says: "I confess I do not understand how it can act, but though indeed there are testimonies of its virtues in epileptic and maniac cases." The same author also states, that "there are many well vouched testimonies of its virtues, particularly of its diuretic powers."

If *St. John's Wort* really does possess these properties, it

certainly deserves attention, and would be an invaluable addition to the *Materia Medica*. I am not aware that this plant, or more than one of its preparations, are now used. Some of them, however, were officinal in the foreign *Pharmacopœias*. The preparation to which I have just alluded, is the oleaginous infusion of the flowers. This is frequently used as an application to contusions, speedily removing the blackness, and effecting a cure.

Before dismissing this subject, I think it proper to state, that the *St. John's Wort* is a plant generally detested by the agriculturist in consequence of its pernicious effect on some of his domestic animals. It is a curious fact, that if this plant comes in contact with a white portion of the skin of either the horse or the cow, the part becomes highly inflamed, and a very painful sore is produced; whereas, if the skin be of any other colour, it remains unaffected. I have also observed that if the sore thus produced, from any cause becomes wet, the effect is evidently agonizing pain to the animal. It is also said that sheep, suffered to run in a pasture where this plant is abundant, prematurely shed their wool.



## SELECTED ARTICLES.

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ART. VII.—RESEARCHES ON THE COMMERCIAL POTASH OF THE STATE OF NEW YORK. By LEWIS C. BECK, M. D., Professor of Chemistry in the University of the City of New York, &c.

POTASH is one of those articles, the manufacture of which, it has been deemed advisable to regulate, by inspection laws, the avowed object of which is to protect the consumer against the negligence or frauds of the manufacturer. In this state, the propriety of legislative action on this subject is, perhaps, more apparent than elsewhere, in consequence of the value of the manufacture, which may be estimated at more than a million of dollars annually. But from the nature of the article in question, it became difficult to devise an unexceptionable mode of inspection, without the employment of some chemical processes, which although sufficiently simple, have not been hitherto adopted. Hence potash of an inferior quality, has sometimes passed through the ordinary inspection, and found its way into our own markets and into those of foreign countries. This fact, which was in a good degree attributable to the erroneous notions which prevailed in some parts of the state, concerning the principles of the manufacture, upon being communicated to Gov. Throop, induced him to present the subject to the consideration of the legislature. The result was a formal investigation, during the sessions of 1832 and 1833, by the committee on trade and manufactures of that body; and as the inquiry involved chemical details, I was honoured with a commission to examine into the various processes adopted in the manufacture of potash, and to analyze samples of the various kinds brought to market. That duty I endeavoured faithfully to discharge, and made full reports of

the results of my investigations. These reports were published among the documents of the legislature, but as their circulation was necessarily limited, I have thought that a summary of the facts which they contain, might be, with advantage, more widely diffused. I have accordingly prepared the following paper, which you will oblige me by publishing in your valuable Journal.

*Various methods of Manufacturing Potash, pursued in the State of New York.*

The most plausible view of the formation of the carbonate of potash, (the form in which commercial potash occurs,) by the incineration of wood, is that the acetate of potash exists in the wood, and that this, by calcination, is converted into the carbonate. The wood is burned upon the earth, in a situation protected from the wind, the result of which is the formation of carbonate of potash and several other soluble salts, together with some substances upon which water has no action. By lixiviation with hot or cold water the soluble part is dissolved out, and this solution, when boiled to dryness, leaves behind a dark brown saline mass, consisting of carbonate of potash, a minute portion of one or two other salts and a small quantity of vegetable inflammable matter; and in this state it is known in commerce by the name of *Potash*. Calcination, at a moderate heat, completely burns off the colouring particles, and the salt becomes of a spongy texture, and beautiful blueish white tinge; it is then called *Pearlash*.

Such are the simple principles upon which these important articles are prepared. But instead of following them, various substances are frequently added, either previous to, or during the boiling, *ostensibly* for the sole purpose of facilitating the manufacture, but which *really* have the effect of increasing the weight of the resulting mass at the expense of its purity.

To show what absurd notions were entertained on this subject, and the necessity which existed for legislative interference, I will here introduce the specifications of a patent obtained in February, 1831, by an inhabitant of Oswego

County, N. Y., for what is termed "an improvement in the manufacture of potash." Strange as it may seem, many well meaning and practiced manufacturers were deceived by the specious pretensions of the patentee, and actually, for some time, pursued the process which he recommended.

The "improvement" thus proposed is announced in the following words. "The compound used is salt, lime and lamp oil. First, when beginning to melt, after the salt has done rising, it can then be ascertained what quantity of potash you are going to have. Suppose one barrel: First, take half a bushel of salt, sprinkle half of it over the top of the potash: Secondly, take two bushels of slaked lime, add that in the same manner, then the remainder of the salt, and when the lime has disappeared, then add half a pint of lamp oil. This is the quantity used for one barrel; but it may be varied as the nature of the case may require. First, the use of the salt is to create a heat, and to purify the potash; as it is supposed to burn up, and add nothing to the quantity, but to the quality: Secondly, the lime is supposed to melt and become the first rate potash: Thirdly, the oil is to create a blaze to consume: Fourthly, these are the contemplated uses of the above ingredients used by me."\*

\* It need not excite surprise that such nonsense should gain currency among ignorant manufacturers, when intelligent and even scientific men, often countenance the most absurd pretensions. I once saw the names of several respectable gentlemen, and among the rest that of a professor in one of our colleges, attached to a certificate in favour of a perpetual motion, which the inventor had the folly to exhibit. And, more recently, I have observed that a certain "improved compass needle," has received the approval of several of our naval officers, and has been noticed with apparent commendation in England. (*See Lond. & Edinb. Phil. Mag. &c. May, 1835.*) In regard to this "improved needle," I will only add, that it is said to have been the means of losing, for a friend of mine, a valuable vessel and cargo; and that the construction of it is false in principle, and its use must be hazardous in practice. Scientific men often do themselves great injury and subject those who place confidence in them to serious losses by their endorsements of such valueless papers.

On the subject of this specification, I shall only express my entire concurrence in the remarks of Dr. Jones, the editor of the Franklin Journal. "If," says he, "a patent had been required for deteriorating one of the staples of our country, the one under consideration would most completely have fulfilled the intention ; and it is earnestly hoped that its validity may, in some way, be tested in our courts of law, where we apprehend, it would not be esteemed a 'useful invention' according to the intention of the patent law ; as its inevitable result if acted upon, must be to injure the reputation of American potash in foreign countries ; the material would be entirely spoiled as it regards its use in many manufactures."

There is another patent which deserves a more detailed notice, as it contains a process much more extensively introduced, and which in some respects is a real improvement upon the ordinary mode of manufacture. At least the samples thus prepared, contain, as we shall hereafter see, a larger proportion of alkali, than any at present in market.

The patent to which I now refer, was secured in July, 1831. The original specification may be found in the 9th volume of the Franklin Journal. The process, however, has recently been varied, and now consists, essentially, in employing small leach tubs which are to be prepared in the usual manner, by placing sticks, straw and quicklime at the bottom. Over this is to be placed a layer of ashes, of about four inches in thickness, which is then to be treated with a boiling liquor, prepared by adding eighteen pounds of salt, and one bushel of quicklime to ninety gallons of water. Another layer of ashes is then to be added, which is to be treated with the liquor as before, and so on until four layers of ashes have been introduced,—when cold water is to be added, and to remain five or six hours. The lixivium is then to be boiled and "melted down" in the usual way.

It is asserted that by the above process of working, about one-half the quantity of ashes will be saved, the potash melts easily in consequence of its purity, the kettles last much

longer, and less fuel is required in the melting than by the ordinary method.

This patent, in its principal feature, closely resembles one obtained in England by Thomas Howard, in 1801 ;—the specification of which is recorded in the Repertory of Arts, 1st Series, Vol. 16. It is entitled “specification of a patent for a method of making a British barilla and potash, and of obtaining a greater quantity of alkali than hitherto discovered.” In this process, quicklime, in large proportion, is added to refuse alkaline salts, by which means their decomposition is effected, and a large quantity of pure alkali obtained.

I will now briefly state what I consider to be the advantages and disadvantages attending the American process above described.

*Increased amount of alkali obtained from the ashes.*—From the certificate of a respectable gentleman which was submitted to the committee of the Legislature, it appears, that in an experiment which he tried, twelve bushels of ashes yielded upon the old or common plan, seventy-eight pounds of potash, whereas the same quantity of ashes treated according to the process in question, yielded one hundred and forty-five pounds. The general correctness of this result is confirmed by the testimony of several intelligent manufacturers, with whom I have conferred. There is said also to be a great saving of time in performing the operation.

The above advantages, are of course, derived from the use of small leach tubs and the employment of hot, instead of cold water ; by which the alkaline salt is more completely as well as more speedily dissolved.

*Employment of Quicklime.*—Another benefit resulting from this process, arises from the mode in which the lime is mixed with the ashes in alternate layers. It should here be distinctly observed, that the effect of the employment of lime in the manufacture of potash, depends altogether upon circumstances. When mixed with the ashes, previous to the lixivation, the resulting alkali is more pure or caustic, because the lime combines with the sulphuric and carbonic acids ex-



isting in the sulphate and carbonate of potash, and forms salts which are insoluble in water. This indeed is the mode in which the pure potash of chemists is obtained. In the ordinary process, the lime is placed only in the bottom of a large tub; but in the one under consideration, it is distributed throughout the whole mass of ashes, and thus its action is rendered more efficient.

The correctness of these views is strikingly confirmed by M. Becquerel, who has ascertained by his numerous analyses of different kinds of ashes, that those of the lime burner contain very little sulphate of potash, which is undoubtedly due to the action of the lime upon the sulphate of potash with the assistance of charcoal. This fact, M. Becquerel remarks, may lead to some advantage by adding lime to the wood, the ashes of which are intended for the manufacture of potash. (*Lond. and Edinb. Phil. Mag.* 1833.)

The case, however, is very different, when the lixivium is treated with lime and boiled down, without a second filtration. It becomes then a fraudulent operation, because the salts of lime formed by the decomposition of those of potash will all remain in the resulting mass. And in the law regulating the inspection of Pot and Pearl Ashes, it is made the duty of every inspector to condemn every cask thus adulterated; a fact which can be very easily determined by the want of solubility in the sample, and the effervescence of the insoluble portion upon the addition of a dilute acid.

Upon inquiry, I find it to be a common practice, to use lime in the manner just described.—The reason which the manufacturers urge is, that its addition to the ley while boiling, assists in “keeping back the nitre,” as they term it, and thus facilitating the subsequent steps of the process. By “the nitre” is undoubtedly meant the sulphate of potash, which, being much less soluble than any of the salts contained in the ashes, begins to crystallise long before the others, and forming a solid crust, proves somewhat troublesome, and should be removed, if the quantity be considerable. Instead of this, however, the manufacturers add lime, which, by decomposing

this salt forms the sulphate of lime, and this with the portion of lime not acted on, falls to the bottom of the kettle, while the potash resulting from the decomposition of the sulphate, enters into other combinations. The lime rapidly absorbing carbonic acid from the air, is converted into carbonate of lime, and hence carbonate and sulphate of lime constitute the largest proportion of the insoluble matters, which are often found in such large quantity in our samples of potash.

I have been the more particular upon this point because, in the original specification of the patent now under consideration, it was proposed to add lime to the lixivium, a practice which, however general it may be, I have uniformly condemned. But I have the depositions of two manufacturers, and the assurances of several others, that more recently, the mode adopted is that which I have given above, and in which it will be observed that such addition is omitted.

*Addition of Common Salt.*—The addition of this substance to the lixivium is a most unwarrantable practice, as it injures the quality of the potash, while its presence cannot easily be detected. The reason of this will be apparent, from the fact long known to chemists, that when common salt is added to carbonate of potash in solution, a double decomposition takes place, the result of which is the formation of chloride of potassium and carbonate of soda; the former being almost wholly useless, and the latter being employed for purposes, other than those to which common potash is ordinarily applied.

The danger attending the adulteration is, that the chloride of potassium and carbonate of soda thus formed, are both highly soluble in water, so that they would escape detection by the ordinary mode of inspection, and samples in which they were contained in considerable quantity, be branded as “first sort.”

The reason advanced by the manufacturers in favour of the use of salt, is that it facilitates the “melting of the potash.” But this advantage can by no means make up for the positive injury done to the potash by its addition.

It was not until I had proceeded in this investigation, that I ascertained how general this mode of adulteration had become. Several manufacturers have assured me, that salt is almost always added to the lixivium, in the ordinary method of preparing potash. If this is so, the objection which I have to this part of the patented process will equally apply to the other. It is proper, however, to state, that while the proportion of pure alkali in the specimens of potash, which I have analyzed, is in favour of those manufactured by the patented process, the chlorides of sodium and potassium, which may be fairly set down to the admixture of common salt, are also contained in them in larger proportion.

There is one consideration in connection with the use of salt, which is deserving of some attention. And it is that at present, the only object of the manufacturer is to produce an article, which shall pass inspection as "first sort." It is by this brand, that the market price is regulated, and the extra time and labour required to manufacture a more pure potash, would, under the present system of inspection, be entirely lost. A premium is thus, in effect, set upon ingenious adulterations, and, under all the circumstances, we can scarcely attach blame to those, who endeavour to avail themselves of its benefit.

In concluding this part of my paper, justice obliges me to state, that the specimens of potash manufactured according to the patent process, which has been here described, equal, if they do not exceed, in purity, those which have been ordinarily ranked as "first sort." And if the facts, with regard to the increased amount of alkali obtained from the ashes, can be at all relied on, it must be considered in many respects, a valuable improvement. But from the very nature of the case, its continuance, as such, must depend, in a great degree, upon the honesty of the manufacturer, and upon the vigilance and skill of the inspector.

*Analysis of several varieties of Potash.*—In the examination of these specimens, my chief object was to determine the proportions which they contained, of what are usually called impurities. The other substances which commercial

potash is known to contain, in minute proportions, I did not consider it necessary to separate, as it would have occupied much more time, and after all would have been attended with little practical advantage. My design was, not so much to present complete chemical analyses, as to show, in the plainest manner, the comparative value of the specimens which I examined. The following is the process which I adopted:

A. Five hundred grains of the specimen under examination were dissolved in six or eight ounces of water, heated to about  $200^{\circ}$  Fahr. and the solution filtered. The matter on the filter was again washed with a small quantity of water, and after being perfectly dried, was weighed, and the amount set down as insoluble residuum.

B. The insoluble matter was treated with dilute nitric acid, and then tested with various reagents. It generally consisted of carbonate of lime, oxide of iron and siliceous matter, although the proportions were very various. These I did not think it necessary, in each case to determine.

C. The weight of the filtered solution A, was now determined, and to a known portion of it, acetic acid was added until the alkali was completely neutralized.

D. To this neutral solution, solution of acetate of baryta was added as long as it caused any precipitation, and the whole then filtered; the resulting sulphate of baryta, being dried and weighed, gave by estimation, the amount of sulphuric acid contained in the whole solution (A.) Supposing this acid to be combined with potash, the amount of sulphate of potash, in the sample under examination, was easily settled. No account was taken of the small quantity of sulphate of lime, which might be contained in the solution.

E. To the filtered solution D, nitrate of silver was now added, as long as any thing was thrown down by it. The resulting precipitate was dried and weighed. This was chloride of silver, and from its weight, by estimation, the whole amount of chlorine was determined. Supposing this to have been originally combined with potassium, the amount of chloride of potassium was deduced.

Although from several experiments, I was satisfied that soda was also contained in most of the specimens which I examined, the curious play of affinities between the salts of soda and of potash, rendered it difficult to determine the exact state of combination in which it existed. Indeed, the process required for their separation, especially when the soda is in small proportion to the potash, is so delicate as to preclude its employment in ordinary inspection. It may, however, be of use to the inspector, to be aware of the different effects produced upon the carbonates of potash and soda by exposure to the air; the former, as it is well known to chemists, soon becomes moist, and assumes the liquid form, while the latter is not thus affected. I am the more particular in adverting to this fact, because I have heard it urged as an objection to some samples of potash that, by exposure to the air, they rapidly deliquated or became moist. But of course the more rapidly potash undergoes this change, the more pure is it to be considered. It should not, however, be understood, that moist potash is the purest; for in this state, it contains a large quantity of water, which adds nothing to its value. I performed an experiment to ascertain the increase of weight which common potash experiences, by exposure to a moist atmosphere. The mass weighed four hundred and thirteen grains. After three hours exposure, it had gained five grains; in twenty-four hours, its weight was increased twenty-seven grains, or more than six per cent.

As I have observed, the presence of soda was inferred in several of the specimens and, had time permitted, might probably have been detected in all. In two of these, however, it existed in such large proportion, that it could be readily separated by adding muriatic acid, and carefully crystallising the solution. I would particularize No. 7 in the following table, which was designated by the inspector, as "highly salted," a decision which my analysis fully confirmed. It is probable, for reasons which have been given in the former part of this communication, that the soda existed in the form of carbonate,

and its occurrence, in such large quantity, may be fairly ascribed to the employment of common salt.

The following table will exhibit the comparative purity of the specimens which I analyzed, and in order to show in what respects they differ from the American potash, analyzed many years since by the celebrated Vauquelin, I have prefixed his results, reduced to the same number of grains which I employed.

*Table showing the composition of several varieties of Commercial Potash.*

	Insol- uble mat- ter.	Sul- phat. pot- ash.	Chloride of potassium with chlor. of sodium.	Carbonated alkali and water.	Total.	Impurities in 100 parts of pot- ash.	Carbonated alkali in 100 parts of potash.
1	.8	66.8	8.7	423.7	500	15.3	84.7
2	58.	37.5	36.5	368.	500	26.4	73.6
3	2.5	31.5	75.	391.	500	21.8	78.2
4	12.	61.	54.	373.	500	25.4	74.6
5	8.	57.5	50.	384.5	500	23.1	76.9
6	57.	22.	46.	375.	500	25.	75.
7	38.	52.	161.	246.	500	50.8	49.2

No. 1. Is the result of the analysis of Vauquelin, made about 1802.

No. 2. A specimen received from an inspector at Albany, and marked as "first sort, but not of the best quality."

No. 3. Supposed to have been made according to the original patent of Ephraim Pearce, (*Franklin Journal*, vol. ix.) in which lime and salt were employed. It was nearly white, with a pearly lustre.

No. 4. From the same parcel as the last, but of a darker colour; the average per cent. of carbonated alkali in the two specimens is 76.4.

No. 5. Received from an inspector, and labelled "made partly on the patent plan"—colour whitish.

No. 6. Another specimen of the same kind as No. 5, but of a darker colour. The average per cent. of carbonated alkali is 75.8.

No. 7. A specimen of a beautiful reddish colour, which had been condemned by the inspector at New York, and labelled "highly salted." A large proportion of the one hundred and sixty-four grains consisted of common salt, which had apparently undergone no change. Although the insoluble residuum was much less than in No. 2, the total amount of impurities was more than fifty per cent. This is an instructive lesson to those who have been deceived by the notion expressed in the first patent, that the salt is "burnt up."

Having now determined, with what I conceived to be a sufficient degree of accuracy, the nature and proportions of the impurities contained in the above, I dissolved three other specimens in water, and to the filtered solutions added nitric acid of known specific gravity until the alkali was completely saturated, according to the ordinary chemical method of ascertaining the value of samples of potash or soda. The following are the results.

*Table of the composition of specimens of Potash determined by solution in water and saturation by nitric acid.\**

	<i>Insoluble matter.</i>	<i>Pure alkali.</i>	<i>Soluble impurities, carbonic acid and water.</i>	<i>Total.</i>	<i>Carbonated alkali per cent. by estimation.</i>
8	3.	252	245.	500	From 65 to 70.
9	5.5	251	243.5	500	
10	6.	256	238.	500	

No. 8. Was common potash, "second sort" from New York. No.'s 9 and 10 were from Albany, but the mode of manufacture was not certainly known.

I subsequently analyzed two specimens made with great care, expressly for the purpose of testing the relative merits of the common and patent processes. Depositions of these facts were presented to the committee of the Legislature, and the boxes, containing the parcels, were transmitted to me un-

\* This process is perhaps open to the objection stated in the concluding part of this paper.

opened. Portions of them were carefully analyzed, in most cases repeating the processes and deducing the mean. The general formula which I adopted, was that already given, with the addition that during the operation C, I ascertained the amount of carbonic acid, which had been expelled by the action of the acetic acid.

*Table of the proportion of hydrate of potash, carbonic acid, &c. contained in two specimens of commercial potash.*

	<i>Insoluble matter.</i>	<i>Sulph. of potash.</i>	<i>Chlor. of potassium &amp; sodium.</i>	<i>Carb. acid.</i>	<i>Pure hydr. of potash</i>	<i>Total.</i>
11	1.7	12.5	6.9	5	73.9	100
12	2.5	10.2	11.1	2	74.2	100

No. 11. Was manufactured according to the common method.

No. 12. Manufactured according to the patent already described. Both were prepared expressly for trial as above stated.

In reviewing these analyses it will be found, that there is almost every variety in the parcels of potash brought to market. In those kinds which pass inspection, the proportion of what is called carbonated potash, varies from about sixty to eighty per cent. It is proper to remark, however, that I use the term "carbonated" in an indefinite sense, for the carbonic acid is seldom in the proportion necessary to constitute the true carbonates. In some instances, as in the two last, the amount of carbonic acid was exceedingly small, which is perhaps to be ascribed to the free use of lime, and to the cautious exclusion of the atmosphere, and also to the fact that I always selected fragments from the interior of a large mass.

*Improvements of the manufacture.*—From the facts which have now been presented, some opinion may be formed of the nature and extent of the adulterations of the potash, manufactured in the State of New York. It is a question not easily settled, whether any further legislative provisions are necessary to ensure the purity of this article. Taking it for granted



that inspection laws are right and proper, in cases like the present, it seems to me that they should be rendered more efficient in their operation. I know it is urged, with some plausibility, that the reputation of our potash is now higher in foreign markets, than that of any other country, and that it is not for our interest to improve the manufacture. In answer to this, however, one or two facts deserve to be mentioned. The first is that although when potash can be largely adulterated, and still, by the ordinary inspection, pass as first or second sort, there is a premium placed on the most successful adulteration, the fraud cannot long escape detection. The large manufacturing establishments, both in England and on the continent, are generally conducted by practical chemists, who are familiar with the modes of testing the purity of the substances which they employ. Such tests, if I do not mistake, they constantly apply in the case of commercial potash, and by them its true value is determined. American potash cannot surely retain its high character, if the consumer finds it to contain one-third or one-fourth its weight of soda salts.

Another consideration worthy of notice is, that the carbonate of soda, the barilla of commerce, is now extensively manufactured in England and France, and its abundant supply appears destined to exert an important influence, upon the manufacture of potash in this country. The soda-ash, as it is commonly called, is much cheaper and answers equally well for most of the uses to which alkaline substances are applied. Potash, however, will still continue to be preferred in many of the arts and in some indeed it is indispensable. But to retain its value in this respect, it is necessary that it should be of tolerable purity. When it contains a large admixture of salt, it can be of little more value in foreign markets than the soda-ash, and such will soon be its level, if these adulterations become, as all past experience leads us to fear they will, increased in their proportions and extended in their employments.

It is therefore plainly our interest by all means, to prevent the adulteration of our potash, and to encourage the adoption

of those chemical principles, which should regulate the manufacture. But this desirable result can scarcely be expected, without some improvement in the mode of inspection. I am aware of the tact which the inspectors acquire, by the constant examination of samples of potash, and of the accuracy with which they ordinarily judge of their relative purity. But there are cases in which they are liable to be deceived and against which, it is important to guard. Being sensible of the extreme difficulty of introducing new regulations into such an every day business, it is not without some hesitation, that I am induced to offer the following suggestions.

1. There are now, I believe, three sorts of potash recognised by the inspectors; but if my information be correct, the samples passed as "first sort," always contain a considerable proportion of lime, to say nothing of soluble impurities. Another brand designated "pure," or by any other convenient term might, in my opinion, be advantageously introduced. Samples thus branded, should contain no lime or salt, and at least eighty-five per cent. of carbonated potash.

2. The insoluble impurities may be easily determined, by dissolving a known quantity of potash, as five hundred or one thousand grains, in pure rain water, conducting the operation in a glass flask, and applying a gentle heat to facilitate the solution. Then filtering the solution, washing the precipitate, if any, and drying it carefully, the per centage of insoluble matter can at once be ascertained. When the proportion exceeds two or three parts in the hundred, it is probably due to the carelessness of the manufacturer, or to the addition of lime to the alkaline liquor during its evaporation.

3. The soluble impurities are more difficult of detection; and it is by no means easy to reduce the process to a single trial. The mode ordinarily prescribed in chemical works, consists in determining the saturating power of the specimen under examination, and very convenient instruments for this purpose are described by Mr. Faraday, and MM. Descroizilles and Gay Lussac. In these instruments sulphuric acid of known specific gravity, is employed in a fixed quantity, and

added to a given weight of the sample, (previously dissolved in water, and the solution filtered,) until by a test paper, it is shown, that the alkali is exactly neutralized. The amount of acid required to produce this effect, will, if its strength be exactly known, indicate the proportion of pure alkali, contained in the specimen under examination.

It is evident, however, that this process is insufficient to detect the presence of soda, and when that substance is in large proportion, it is too objectionable to be relied on, for the reason that the saturating powers of potash and soda are very different. For example, fifty parts of soda will saturate as much of any given acid as seventy-five parts of potash; so that in practising with this test, a mixture of twenty-five parts of soda and 37.5 parts of potash = 62.5, would give the same result, as seventy-five parts of potash. In this instance then, there would be an error of 12.5 per cent., to say nothing of the difference in the value of soda and potash.

4. If the above remarks are correct, it follows as a consequence, that in all cases where carbonate of soda is mixed with potash, the relative proportions of these alkalies must be determined, before we can fix the real value of the sample under examination.

The only unexceptionable mode of separating potash from soda, is by means of nitro-muriate of platina; but this is an expensive article, and its successful employment requires a nicety of manipulation which can be expected only from the experienced chemist. An approximation to a correct decision on this point may be attained by adopting the steps prescribed in D and C, in the preceding formula. By adding to a known quantity of the alkaline solution, an amount of nitric acid sufficient for its neutralization, the sulphates and chlorides may be thrown down, first by the acetate of baryta, and afterwards by the nitrate of silver. If the latter test occasions an abundant precipitate, we may infer that the solution contains an admixture of common salt; for although chloride of potassium is contained in the purest samples of potash, it seldom constitutes more than two or three per cent.

It may also be mentioned that tartaric acid, when added to a portion of the solution, will throw down the potash in the form of a difficultly soluble salt, (the bitartrate of potassa, or cream of tartar,) but the soda will be retained in solution, and may be separated by subsequent evaporation.

Difficult as are these methods of separating the salts of soda and potash, and desirable as it would be to devise a more simple one, if it is really an object to maintain a system of inspection worthy of the name, heavy penalties should be affixed to the use of all adulterants, and complete analyses of the various samples in market should be made at short intervals by the inspector, or by some competent person under his direction.

*Amer. Journ. Sci. and Arts.*

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#### ART. VIII.—ON THE RESINS. By HENRY ROSE.

RESEARCHES on isomeric organic substances, and on the manner in which they comport themselves with other bodies are of the highest importance; and those of MM. Blanchet and Sell, on the essential oils, are among the most interesting of these investigations. These chemists have shown that many of the non-oxygenated essential oils were constituted alike, and the observations of other experimenters have augmented the number of isomeric bodies of this class; thus MM. Blanchet and Sell considered as isomeric: 1 and 2, the two oils composing oil of turpentine, to which they have given the names of *dadyl* and *peucyl*; 3 and 4, the two oils constituting oil of lemons, which they have called *citronyl* and *cytryl*; and according to M. Blanchet, to these must be added, 5, oil of copaiba; 6 and 7, the two oils composing oil of Juniper. M. Ettling has also found that the following belonged to the same category; 8, oil of cloves, and 9, oil of valerian, when they are freed from the acid with which they are combined.

The combinations of these oils with oxygen have not hitherto been studied with that attention their importance demands. M. Henry Rose has lately, however, undertaken this task; and being of opinion that it would be most advantageous to investigate the composition of resins furnished by the isomeric essential oils, he confined himself principally to this class; his researches on these were capable of great extension, for, as pointed out by Unverdorben, most of the resins derived from essential oils act like acids, and form saline combinations with inorganic bases; some again, of which several can be obtained in a crystalline form, are wholly destitute of acid properties; the author has, therefore, also examined some of the crystalline resins of this latter character.

#### RESINS HAVING THE PROPERTIES OF ACIDS.

*Resin of Copaiba.* No one of the resins can be obtained in as fine crystals as the resin of copaiba; they are best procured by the process first indicated by Schweitzer. They are of a pure white colour, the smaller being transparent, the larger are translucent; they are soft; concentrated alcohol, when aided by heat, dissolves them more readily than when cold. The alcoholic solution reddens litmus paper. This resin combines with the inorganic bases, and these combinations have all the properties of salts. 0.509 grammes of the crystallised resin were decomposed with oxide of copper in the apparatus of Liebig. They afforded 0.464 grammes of water, and 1.459 grammes of carbonic acid; hence 100 parts are composed of—

Carbon	79.26
Hydrogen	10.15
Oxygen	10.59
	——100.00.

Now, this composition is in accordance with that given by MM. Blanchet and Sell as the constituents of colophane, viz.: carbon 79.65, hydrogen 10.08, oxygen 10.27; colophane is an oxide of the oil of turpentine; as the composition of this latter, according to M. Blanchet, is the same as that of the oil

of copaiba, we may consider the crystallised resin of copaiba likewise to be an oxide. We therefore see that isomeric bodies, when oxidized may afford isomeric oxides.

The composition of the resin of copaiba, like that of colophane may be expressed by the formula,  $10\text{C} + 16\text{H} + \text{O}$ . Its composition, calculated from this formula, would be, carbon 79.275, hydrogen 10.355, oxygen 10.37.

If ammonia be added to a solution of resin of copaiba in alcohol, no precipitate is formed, as takes place with the generality of the solutions of the acid resins; if the resin be precipitated by water, the ammonia readily dissolves the precipitate. A solution of potash in alcohol has no effect on the alcoholic solution of the resin. A mixture of a spirituous solution of the resin and of a concentrated aqueous solution of potash may be made in all proportions, without any action taking place; but if more water be added, the combination of resin and potash is precipitated with an excess of the base.

An alcoholic solution of the resin is not disturbed on the addition of an alcoholic solution of nitrate of silver; but if a little ammonia be added a precipitate takes place, formed of a combination of resin and oxide of silver, which is redissolved by an excess of ammonia. The precipitate is crystalline, and preserves this structure even after being dried; it dissolves in alcohol though with difficulty; exposure to light alters its colour, as it does the other salts of silver; it melts at a low heat like a resin; if the temperature be increased, it is decomposed, leaving a residue of metallic silver after the combustion of the charcoal.

M. ROSE obtained the following proportions of silver in three different experiments:

1.	0.308 grammes gave	0.081 silver	
2.	0.321	0.082	
3.	0.376	0.096	or

	1st.	2d.	3d.
Oxide of silver,	28.25	27.41	27.40
Resin,	71.75	72.59	72.60

If the resin combines without decomposition with the oxide of silver, it contains in this combination four times as much oxygen as the oxide; for the quantities of oxide of silver indicated above, contain on an average 1.9 oxygen, whilst the resin contains 715. A combination of resin and oxide of silver, in which the proportions of oxygen are in the proportion of 4 to 1, would, according to calculation, be formed of 28.42 oxide of silver, and 71.58 resin; the result of the first experiment is in accordance with this; in the two others, a little resin had been evidently precipitated with the combination.

0.3575 gram. of this, belonging to the quantity employed in the third experiment, and consequently containing 0.2575 of resin, gave, on combustion with oxide of copper, 0.243 gram. of water, and 0.757 gram. of carbonic acid, corresponding to 10.40 per 100 of hydrogen, and 80.65 per 100 of carbon. It results, therefore, that the resin combines with the oxide of silver, without decomposition.

An alcoholic solution of acetate of lead poured into an alcoholic solution of resin of copaiba, caused an abundant precipitate of a combination of resin of copaiba and oxide of lead; this precipitate was less crystalline than that with the oxide of silver. When heated in a dry state, it melted like a resin. To analyze it, M. ROSE calcined it carefully in the open air, and obtained for residue a mixture of oxide of lead and metallic lead; the oxide was afterwards dissolved in diluted acetic acid.

1. 0.455 gram. of the combination gave 0.074 gram. oxide of lead, and 0.048 gram. lead.

2. 0.5755 gram. of the combination gave 0.0415 gram. oxide of lead, and 0.108 gram. lead.

This combination is therefore composed of:

	<i>1st.</i>	<i>2d.</i>
Oxide of lead,	27.63	27.42
Resin,	72.37	72.58

In this combination also, the resin contains four times as

much oxygen as the base. A combination of resin of copaiba and oxide of lead, in which the proportions of oxygen are as 4 to 1, would contain by calculation 26.56 oxide of lead, and 73.44 of resin. The proportion of resin in the specimens subjected to analysis, is therefore a little less. This difference arises from the fact, that an alcoholic solution of the acetate of lead always lets fall a precipitate of carbonate of lead, when it is not perfectly protected from the action of the air.

The combination of this same resin, with lime, gave an analysis:

Lime,	8.32
Resin,	91.68

This combination presented an analogous composition to the last. The oxygen of the base being only a fourth of that contained in the resin. By calculation, a similar combination of resin of copaiba and lime would contain 8.45 per 100 of lime, and 91.55 per 100 of resin.

As the three combinations of resin of copaiba with oxide of silver, oxide of lead and lime, have an analogous composition, it results that this resin seems to form a series of saline combinations with bases, in which the proportion of oxygen in the resin is four times as much as that of the base. It would hence appear that the atomic weight of the resin is four times greater than that indicated in the formula before given. The true formula, therefore, is not  $10\text{ C} + 16\text{ H} + \text{O}$ , but  $40\text{ C} + 64\text{ H} + 40\text{ O}$ . M. ROSE thinks that it is rational, and perhaps more rigorously correct, to transform this as follows:  $4(10\text{ C} + 16\text{ H}) + 4\text{ O}$ .

*Crystallisable Resin of Colophane.*—This resin was obtained in a crystalline form by RIES and Unverdorben. The latter, especially, has carefully described its preparation, its properties, and its combinations. As it enjoys all the properties of an acid, he named it *sylvic acid*. M. Berzelius designates it as resin *b* of turpentine, whilst he marks the less crystallisable resin found in the same substance as *a*.

Mr. Rose was unable to obtain crystals of this resin sufficiently well defined to determine their form; what he pro-



cured was rather a crystalline mass than distinct crystals. This resin, he also states, crystallises with much more difficulty than that of copaiba.

Its solution in alcohol reddens litmus paper, and possesses all the properties of an acid, as it forms saline combinations with inorganic bases. 0.538 grammes of the crystallised resin, gave by decomposition with the oxide of copper, 0.481 grammes of water, and 1.540 grammes of carbonic acid; its composition is, therefore:

Carbon	79.15
Hydrogen	9.93
Oxygen	10.92
	———100.00.

From these, and a series of experiments similar to those instituted on the resin of copaiba, it results, not only that the crystallisable resin of colophane has the same composition as the resin of copaiba, but also that both, considered as acids, have the same capacity of saturation. There is, in fact, the same relation between them, as between tartaric and paratar-taric acids; but the resemblance is even greater, as both are anhydrous, whilst tartaric acid is distinguished from para-tartaric in the crystalline state by containing a less portion of water of crystallisation.

The combination of this resin with lead has precisely the same composition as that of lead and the resin of copaiba. It is in the form of a white powder, which melts at a low heat like a resin.

*Uncrystallisable Resin of Colophane.*—Unverdorben has called this *Pinic acid*, and, as before stated, Berzelius has designated it as Resin *a* of turpentine. Although it cannot be obtained in a crystalline form, M. Rose subjected it to some experiments, more to ascertain its capacity for saturation, than to determine its composition.

Its alcoholic solution presented precisely the same phenomena as those with the crystalline resin. Its combination with lead is insoluble in alcohol; it is prepared in the same

way as that with the crystalline resin. 0.6255 grammes of this combination gave on analysis, 0.0275 grammes of oxide of lead, and 0.133 grammes of lead, it is therefore composed of:

Oxide of lead	27.31
Resin	72.69
	—100.00

This same combination, analyzed with oxide of copper, gave precisely the same composition as that of resin of copaiba and the crystallised resin of colophane.

*General Observations on the Acid Resins.*—It follows, from the preceding experiments, that the resins produced by the oxidation of the essential oils are not only isomeric, but also that they have the same capacity of saturation as regards bases. MM. Blanchet and Sell have found that the isomeric essential oils, which are not oxygenized, combine with hydrochloric acid, sometimes in one proportion, sometimes in another.

If the above mentioned resins be considered as acids, they differ from most of those of organic origin, by the absence of water of crystallisation; as it is well known that hitherto but few of the organic acids have been obtained in an anhydrous state, except by combining them with bases. Unverdorben, it is true, considers sylvic acid as a hydrate, but this opinion is contradicted by the experiments of M. Rose.

All the combinations of the acid resins with bases examined by this chemist, are also destitute of water of crystallisation; after having washed them with alcohol, they dry readily, and do not attract moisture from the air.

The change of essential oils into resins has often been compared to that of fatty bodies into acids, but the experiments of M. Rose show the fallacy of this comparison; doubtless by the oxidation of fatty substances in the air a small quantity of acid is generated, but there is also a formation of other products; whilst the transformation of the essential oils into resins is a simple result of the oxygenation of the oil by the oxygen of the atmosphere.

*Resins which do not possess the properties of Acids.*—M. Rose treats only of a few of the crystalline resins of this

class, which have been denominated sub-resins by M. Bonastre, who was the first to prepare several of them. Their principal distinctive character is that of being less soluble in alcohol than the other resins and of being partly deposited from their solution in boiling alcohol.

*Crystalline Resin of Elemi.*—If elemi be treated with cold alcohol, and the residue be then dissolved in boiling alcohol, by the spontaneous evaporation of the solutions, a certain portion of a crystalline resin will be obtained, which can be purified by redissolving it in boiling alcohol; the product amounts to one-third of the elemi employed. It is in confused crystalline masses, the form of which is indeterminate. It is of a pure white colour, completely soluble in boiling concentrated alcohol; the solution does not act on litmus paper; it becomes opalescent on cooling, as a portion of the resin separates; at the end of a few days, the separated portions form a flocculent crystalline mass.

The alcoholic solution is not rendered turbid by an alcoholic solution of potash, but an aqueous solution of this alkali throws down the resin in a white mass. The addition of liquid ammonia to the alcoholic solution transforms it into a soft, white jelly. The alcoholic solutions of acetate of lead and nitrate of silver do not cause any precipitate, nor does this take place if a small portion of ammonia be added to a mixture of the solutions of the resin and of nitrate of silver.

If this resin be distilled, a brownish balsam first passes over, of an agreeable smell, and which reddens litmus paper; if the heat be increased, this balsam becomes brown and acquires a disagreeable smell, but still reddens litmus paper; no water is produced, and only a small portion of charcoal remains in the retort.

I. 0.557 grammes of this resin burnt with oxide of copper, afforded 0.5685 grammes of water, and 1.677 grammes of carbonic acid.

II. 0.7635 grammes gave 0.7735 grammes water, and 2.288 grammes carbonic acid.

III. 0.581 grammes gave 0.581 grammes water, and 1.729 grammes carbonic acid.

Its composition is, therefore:

	1st.	2d.	3d.
Carbon,	83.25	82.85	82.29
Hydrogen,	11.35	11.24	11.11
Oxygen,	5.41	5.91	6.60

The result of the first experiment accords very well with the composition of a combination composed like the previously described resins, except that it shows one-half less of oxygen. Its true composition would be, carbon 83.61, hydrogen 10.91, oxygen 5.47. This might be expressed by the formula  $2(10C + 16H) + O$ . This formula would also express that this resin is a lower degree of oxidation of the radical, the higher being the acid resins.

*Crystalline Resin of Euphorbia.*—This is prepared in the same way as the former, but cannot be procured of as white a colour. The form of the crystals is indeterminate.

It is more soluble in alcohol than the resin of elemi; this solution has very little acidity. It has no effect on litmus paper; it does not become opaline on the cooling of the solution, but the resin separates in the form of groups of mammillary crystals. Ammonia produces a white cloud, but the resin does not separate in a gelatinous state, like that of elemi; it is not affected by an alcoholic solution of potash, or even an aqueous one of this base. Solutions of acetate of lead and nitrate of silver do not cause any precipitate.

On distillation, this resin comports itself like that of elemi, the brown balsam obtained by this operation reddens litmus paper.

Its composition, ascertained by burning it with oxide of copper, is:

Carbon	81.58
Hydrogen	11.34
Oxygen	7.07

M. Rose regards this resin as isomeric with the crystalline resin of elemi, and that the difference in composition arises from its retaining a small portion of foreign matter, from which it was found impossible to free it.

*Journ. de Pharm.*

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#### ART. IX.—ON THE AROMA OF THE JONQUIL.

BY M. ROBIQUET.

THE odour of most aromatic plants appears to reside in an essential oil, which can be obtained by distillation; but there are several, as the jonquil, the jasmine, the heliotrope and the tuberose, which although endowed with the richest perfume, do not furnish it in a separate state, and hence to extract it, recourse is had to different methods, the most common of which, is that of placing these flowers in contact with cotton, saturated with some bland and inodorous vegetable oil. This in time becomes charged with the odour of the flower, and is then employed for various purposes by the perfumer. This has led to a belief that these flowers, either contained no essential oil, or that it was so volatile as to prevent its being obtained in a condensed form.

As distillation was useless, I was obliged to have recourse to other means and particularly to the employment of various menstrua. Ether having appeared the most likely to afford good results, from the readiness with which it dissolved the oils, as well as the facility with which they separated from it when the solution was exposed to a very low temperature; I hence had recourse to my adapters,\* and with additional evi-

\* For description of this apparatus, see *Journal Phil. Coll. Pharm.* iv. p. 70.

dence that the principal merit of this kind of lixiviation is, that it extracts substances according to their order of solubility in the menstruum employed.

I therefore filled one of these adapters with jonquil flowers, then poured ether over them, and immediately closed the end with a cork, to prevent the fluid from escaping too rapidly. In fact, it passed drop by drop, and at long intervals. The next day I found in the receiver, two distinct portions of fluid, which I separated by means of a funnel. The upper one was formed of ether of a beautiful lemon colour; the other was merely the watery fluid of the flowers, and was of a greenish colour. The ethereal tincture was immediately subjected to distillation in a water bath, at so low a heat as not to boil the ether. A second and third lixiviation were made in the same manner; each of the tinctures thus obtained was distilled separately, that the products might be the better compared.

The first retort contained a deposit of small yellow masses, variously grouped on the sides, and also some of the ethereal fluid; this was decanted into a small capsule and permitted to evaporate spontaneously. The concrete deposit was removed after the retort had been well drained and the fumes of the ether had entirely disappeared. This substance diffused a strong smell of jonquil, but modified with a somewhat herbaceous odour. This was not the case with the residue in the capsule, its smell was perfectly analogous to that of the fresh flower. This residue not becoming dry in the open air, I placed it on some folds of blotting paper to absorb the moisture, but soon perceived that the fluid was oil and not water. The paper which had become impregnated with it, diffused the most delicious scent. I therefore washed all the product that remained of the first distillation in cold ether, which I immediately filtered, and thus obtained on the spontaneous evaporation of the ether, a few drops of a very odorous yellow oil.

The product in the second retort resembled that in the first. When, however, it was examined with a microscope, it was evident that instead of mammillary or tuberculated masses, it

consisted of small collections of crystals. They diffused very little odour, and this difference was still more perceptible in the contents of the third retort. It should also be remarked, that after each treatment the product of the distillation was less abundant. The third being very trifling I did not push the treatment with ether further, and had recourse to alcohol. This afforded a tincture of a darker colour, being of a brownish tint. This was likewise distilled, and a few yellow mammillary masses, resembling those above described, were obtained, and also a somewhat consistent brown oil, which when heated, gave out a disagreeable smell like that of fish oil.

It appears evident from these experiments that the aroma of the jonquil resides in the oily product combined with the ether of the first treatment. At the same time, to verify whether the concrete substance was in itself odorous, I first washed it with ether and afterwards heated it with boiling alcohol. It was completely dissolved, but on cooling, some gelatinous flakes separated, which when collected on a filter, were found to be white and inodorous; they proved to be wax. The alcoholic solution was evaporated and the mamillary substance obtained, with its primary characters, but on being drained and then dried in the air was found to be destitute of odour.

Hence, the aroma of this flower resides in the oil obtained on the first treatment with ether. But it remains to be ascertained why it cannot be procured by any of the ordinary methods. I am not at present prepared to answer this definitively, as I have not made a sufficient examination of the subject, but in the mean time I may state that this oil is in very small quantities, and is in all probability readily altered. I am even inclined to consider the concrete substance as a result of an alteration, on the following grounds. When the first ethereal tincture has deposited this concrete substance, and on evaporation furnishes only a trace of oil, the last residue is a butter-like matter which becomes liquid by the mere heat of the hand. It may be preserved in this state for several days, but at last grows harder, does not melt even at  $212^{\circ}$

F., and from being transparent becomes opaque. When examined with a microscope, a multitude of small yellow grains are discoverable, resembling the concrete substance obtained from the first tinctures. If this product be treated with ether, it dissolves in an incomplete manner, and this solution, if spontaneously evaporated, affords a yellow inodorous powder identical with the mammiform substance. I at first thought that the ready liquefaction of this product might be owing to the presence of some ether. But if this were the case, the same phenomena would occur when the concrete oil was again treated with that fluid, which, however, is not the case.

To ascertain whether this aromatic principle was very volatile, I heated it to  $212^{\circ}$  in a proper apparatus. Nothing condensed in the receiver except a few drops of an ethereal fluid, and I did not remark the slightest trace of oil, but the whole apparatus was filled with a powerful odour of jonquil, and the product operated upon was sensibly diminished in volume. Nevertheless, what remained was still very odorous. Hence, it would appear, that this aromatic product is volatile, but at the same time cannot again be condensed.

I cannot terminate these observations without mentioning a remarkable property of this same product,—its property of giving a black tinge to iron. Having used the point of a knife to detach some portions of it, I perceived that every part of the blade with which it came in contact was covered with a coat of black.

I have already stated that the concrete product of the ethereal tincture appeared to me to be the result of an alteration of the odorous oil; the following considerations would seem to strengthen this conjecture:

I repeated the treatment of the flowers by ether twice; and the second time, I operated on flowers that had been expanded for some days, and obtained proportionably less of the oil and more of the concrete substance. It was remarkable that as this latter became divested of the former, it lost in like proportion its tendency to assume a mammiform appearance, till finally, that obtained from the last solutions in ether assumed



a crystalline form, resembling that of sal ammoniac. This product also was capable of being sublimed without losing its colour; when heated in a tube, fumes were developed which condensed in small yellow flakes; it is well known that this takes place with neither wax or resin. The essential oils of lemon, &c. deposit in the vessels in which they are kept, a yellow pulverulent substance, which appears to have some analogy to this substance.

I may also state that it is remarkable that the brown oil obtained from the alcoholic tincture, had not been taken up by the ether, as almost all products of this kind are soluble in this vehicle; but I never observed the slightest trace of it in the ethereal tinctures; it might almost be supposed that it was produced under the influence of the alcohol; for after it is once procured in a free state, it is very soluble in ether; hence if it had pre-existed in the flowers, it must necessarily have been taken up by that fluid. It may be, however, that it was contained in small vesicles, whose substance was insoluble in ether, but soluble in alcohol, and hence was protected from the action of the former. It is certain, at the same time, that the solubility of this oil in ether is so great, that I could not make use of this vehicle as a mode of separating it from the concrete yellow substance, even without the aid of heat.

It is owing to the presence of this brown oil that the alcoholic tinctures are so dark coloured, for but little of the concrete substance is taken up by this product. The caustic alkalies dissolve the brown oil and give it a still darker colour. Its smell is widely dissimilar from that of the jonquil; on the contrary, it has some analogy to that of fish oil; this odour is much increased when the oil is heated.

To conclude, without adverting to the principles combined with the water of vegetation, we here have four distinct products extracted by simple lixiviation, and without destroying the organization of the flowers, and all eliminated in the order of their solubility. The odorous oil passes off with the first washing with ether, then the concrete, yellow substance, accompanied with a little wax, and finally, by the alcoholic

treatment we obtain a resinoid oil, which appears to be analogous to chlorophylline.

If these processes be repeated with the intention of obtaining the aroma of the jonquil, the flowers should be used as soon as they have fully opened, in order to avoid, if possible, any change in the oil from the action of the air, and its transformation into the concrete substance. It has been shown, that the oil can be procured by a single washing with ether, as the aromatic portion is the first that is taken up, and hence the subsequent processes of evaporation, &c. can be rapidly performed, so as to prevent the oil from being exposed to the action of the air for a long time.

*Journ. de Pharm.*

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ART. X.—NOTE ON FUMARIC ACID. By M. WINCKLER.

*Fumaric Acid.*—Dr. Winckler described some time since in *Buckner's Repert. Pharm.*, a peculiar acid existing in the juice of the Fumitory, in the form of a fumarate of lime, and in small crystalline grains, in the extract of this plant. The process he advises in order to obtain it, is to coagulate the juice of the fumitory by ebullition, to treat with animal charcoal, and to precipitate with acetate of lead. The precipitate, after having been well washed, is to be mixed with a great quantity of water, and decomposed by means of sulphuretted hydrogen. On filtration, a fluid is obtained, which, after due evaporation, deposits on cooling a great quantity of crystals of fumaric acid. M. H. Demarcay, however, after a careful examination and analysis of these crystals, has satisfied himself that they are identical with the paramalic acid of M. Pelouze.

*Journ. de Pharm.*

ART. XI.—ON THE PROPERTIES OF LIQUID CARBONIC ACID. By M. THILORIER.

*Dilatation.*—This liquified gas presents the strange and paradoxical fact, of forming a liquid more easily distilled than the gases from  $0^{\circ}$  to  $30^{\circ}$  C. Its volume augments from 20 to 29, that is to  $+ 30^{\circ}$  C.; this augmentation equals about half the volume this liquid presents at  $0^{\circ}$  C.; in short, its dilatation is four times greater than that of air, which from  $0^{\circ}$  to  $+ 30^{\circ}$  C. dilates  $\frac{3}{2} \frac{0}{6} \frac{7}{7}$ , whilst the expansion of liquid carbonic acid, between the same thermometrical limits is  $\frac{1}{2} \frac{1}{6} \frac{6}{7}$ .

*Vaporization.*—If the temperature of a tube containing a small quantity of liquid carbonic acid be increased, this liquid boils, and the vacuum becomes filled with vapour, which increases in quantity in proportion to the elevation of the temperature. At  $+ 30^{\circ}$  C. the quantity of liquid at  $0^{\circ}$  required to fill the vacant space, is equal to one-third of the length of the tube. At  $0^{\circ}$  the proportion of fluid is only  $\frac{1}{12}$  of the space filled.

*Pressure.*—From  $0^{\circ}$  to  $+ 30^{\circ}$  C. the pressure of the vapour furnished by the liquified gas rises from 36 to 73 atmospheres; this gives an augmentation of one atmosphere for each degree; it must be remembered that the weight or density of the vapour increases in a proportion far greater than that of the pressure, and that the law of Mariotte is not applicable after liquifaction has taken place. If the density of the vapour be taken as a basis to determine the degree of pressure, that at  $36^{\circ}$  C. would be 130 atmospheres, whilst the gauge only indicates 73.

*Thermoscopic effects.*—If a glass tube containing a portion of liquid, and one of gas be subjected to the action of heat, two contrary phenomena will present themselves.

1st. The liquid will augment by dilatation.

2d. It will diminish by vaporization.

The thermoscopic phenomena are very different, according to the relative proportions of liquid and gas; the former will either dilate, or contract, or remain stationary.

These anomalies have enabled me, says M. Thilorier, to verify the extent of the dilatation and vaporization of this substance. It would appear, that the point of equilibrium, above which the liquid augments in volume, and below which it diminishes is when the liquid occupies  $\frac{1\frac{3}{10}}$  of the tube at a temperature of  $0^{\circ}$  C. If it fills a third, it becomes a retro-grade thermometer, rising with an increase of cold and sinking on the application of heat. If it occupies two-thirds of the tube, it will have the properties of a mercurial thermometer. Its range, however, is limited to  $+30^{\circ}$  C.; for above this temperature the tube will be entirely filled with the expanded liquid.

A thermometer of this kind, for all temperatures below  $+30^{\circ}$  C. would have a great advantage over those in common use. It has been shown that those instruments gradually undergo an alteration, which unfits them for accurate observations.

*Specific gravity.* This liquified gas, whose specific gravity at  $0^{\circ}$  C. is 0.83, presents the singular phenomenon of changing its density from 0.90 to 0.60 in a scale of temperatures from  $-20^{\circ}$  to  $+30^{\circ}$  C.

*Action on external bodies.* Liquid carbonic acid is absolutely insoluble in water, and is incapable of mingling with it. It is soluble in all proportions in alcohol, ether, oil of naphtha, oil of turpentine and carburet of sulphur. It is decomposed with effervescence by potassium; it exercises no action on metals belonging to the six last classes, neither has it any sensible action on lead, tin, iron or copper.

*Cold produced by its sudden and instantaneous change*

*from a liquid to a gaseous state.* When a jet of liquid carbonic acid is directed on the bulb of a spirit thermometer, the alcohol rapidly sinks to  $-90^{\circ}$  C., but the frigorific effects do not correspond to this great depression of temperature; this is owing to the almost total absence of conductivity and the slight capacity for caloric possessed by the gas; hence, the intensity, although enormous, is limited to the point of contact; congelation of mercury can only be produced in very minute quantities, and if the finger be exposed to a jet of the liquid, a highly painful sensation of burning is produced; but the injury is almost always confined to the epidermis.

When ether is mixed with liquid carbonic acid, the ether becomes volatilized. The effects produced by a blowpipe fed with ether rendered gaseous by means of carbonic acid are remarkable; a few seconds suffice to congeal fifty grammes of mercury. If the finger be exposed to the jet, the sensation is intolerable.

Carbonic acid, gaseous at common temperatures and under the ordinary pressure, and liquid under a pressure of thirty-six atmospheres, also becomes solid about  $-100^{\circ}$  C., and remains in this state for a few minutes in the open air, and under the usual atmospheric pressure, whilst at ordinary temperatures its expansive force is so great that it produces an explosion as powerful as the same weight of gunpowder.

This solidification can also be produced by directing a jet of carbonic acid into a small vial; this becomes almost instantly filled with a white pulverulent flocculent substance, which adheres very firmly to the glass, and cannot be removed without breaking the bottle; the promptness with which this product forms in cavities impervious to air or the vapour of water, is one of its most remarkable characteristics.

In assigning  $-100^{\circ}$  C. as the point of solidification of liquid carbonic acid, the author is sustained by facts in the experiment made before the committee of the Academy; a spirit thermometer sank to  $-87^{\circ}$  C.; by adding to these  $87^{\circ}$  the six degrees which the alcohol would have sunk, if the whole tube had been subjected to the frigorific action, we have  $93^{\circ}$ , a

number which is certainly not the maximum of the effect produced by this agent.

M. Thilorier adds that this example of the solidification of a gas, is the more striking and extraordinary, from its having taken place with a gas which requires a great mechanical compression to enable it to assume a liquid state, and which instantly resumes its natural form as soon as the pressure is removed.

*Journ. de Pharm.*

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ART. XII.—NEW RESEARCHES ON OPIUM AND ITS PRINCIPLES. By J. PELLETIER.

I.

I HESITATED for a long time, before I determined to present this memoir, thinking that another treatise on opium would be considered as a work of supererrogation. At the same time, I felt satisfied that many particulars, especially of the chemical history of this drug, were still involved in obscurity, and required elucidation. In a former paper, I made known a new principle, narceine; still more recently, I announced that another principle also existed in it, which I named *paramorphine*; but these two substances required further investigation as respected their chemical and physical properties. The analysis of an opium obtained in France, by incisions made in the capsules of the poppy, presented some peculiarities worthy of notice; as for instance, the absence of narcotine and its replacement by an additional portion of morphia; the discovery of a substance which is only accidentally to be met with in opium, and which although wholly different from morphia, might be confounded with this salt. My being in possession of some facts with regard to morphia of great importance in legal medicine; and, finally, my desire of rendering

public some processes applicable to this branch of chemical analysis, have all determined me to write on a subject, considered by many as exhausted, but in which I on the contrary think that much remains to be done.

## II.

When opium is treated by the experimental chemist, it rarely happens that he is enabled to operate on large masses, hence it happens that some of its immediate principles, especially those which exist in minute proportions, almost always escape notice. In a manufactory, where processes are performed on a large scale, other causes of disappointment present themselves, and great precision is hopeless. As large quantities of the raw material are acted upon, the processes become very tedious, and much time is required for the various manipulations; as filtering, evaporation, &c.; hence substances are liable to change, to react on each other, or to be totally destroyed; in short, the modes of extraction applicable to certain immediate principles of vegetable origin, on a small scale, are not practicable when large masses are to be operated upon. But the result of those operations which too generally are promulgated, are of interest to science, and often merit the widest circulation. My researches of late have principally been directed to the examination of a large quantity of *mother waters*, left after the separation of *morphia*.

## III.

### *Examination of the ammoniacal mother waters of Morphia.*

To obtain narceine and meconine, I have already said, that after having separated the morphine, narcotine and meconic acid from a watery solution of opium, by means of ammonia and barytes, the fluid must be evaporated to a certain point, and then suffered to stand till the crystals form; there is here great difficulty in acting on large quantities. If evaporation be not carried far enough, the fluid ferments and becomes covered with mouldiness; affording only denaturalized products

and ammoniacal salts; if, on the contrary, it be pushed too far, the density and viscosity of the mass prevents crystallisation, and meconine and narceine will not be obtained. To this cause I attribute the want of success of some chemists who have repeated my experiments. The great point is to reduce the mother waters to a crystallisable point. This can be done by acidulating them with hydrochloric acid, then evaporating to the consistence of a thin syrup; this, when kept in a cool place, will become of a honey-like consistence, from the occurrence of thousands of crystals, so small that they are oftentimes only to be distinguished by their sparkling when exposed to the direct rays of the sun. This mass is to be poured on a linen filter, and the thick and viscous fluid that escapes is to be kept for further examination.

To purify the crystals, after having subjected them to pressure in a cloth, they are to be dissolved in alcohol, 36° B., with the aid of a gentle heat. In this operation considerable quantities of caoutchouc and extractive matter are separated. The alcohol must be saturated as far as possible, so as to obtain a crystalline mass on its cooling, or, at all events, after a slight evaporation; this crystalline matter is to be redissolved in a small quantity of boiling water, treated with animal charcoal, and again crystallised.

The alcoholic mother waters will afford a further supply of crystals, by spontaneous evaporation; these are to be treated in the same manner. The crystals must, in fact, be rendered as white as possible by repeated solutions and recrystallisations, taking care at the same time that the mother waters are exhausted at each repetition of the process. I would here remark that the successive employment of alcohol and water is requisite, because the purification of the crystals depends on two circumstances,—crystallisation and decolouration by animal charcoal; and it is well known that the latter is better accomplished by the aid of water, whilst the former is more perfect through the medium of alcohol. The crystals thus purified, were subjected to a series of experiments, which need not be enumerated, but which were intended to determine



their nature; the result was, that they consisted almost wholly of hydrochlorate of morphia, narceine, hydrochlorate of ammonia and codeine, and finally of meconine.

To obtain the morphia, narceine and codeine, the crystalline mass is to be treated with a sufficient quantity of water to dissolve  $\frac{2.0}{100}$ , at a temperature of 120° F.; the undissolved portion will consist almost entirely of narceine; if it is found to contain any hydrochlorate of morphia, it is to be recrystallised once or twice.

The narceine thus obtained, must be treated with ether, which will free it from any traces of meconine; though it seldom contains much, for meconine is much more soluble than narceine under the influence of an acid. The narceine being separated, the solution containing the other substances, is to be evaporated till crystallisation takes place; the crystalline mass is to be treated with sulphuric ether, which will dissolve the meconine only, codeine when united to an acid being scarcely soluble in this fluid. Finally, to separate the morphia and codeine, the crystalline mass is to be re-dissolved and water of ammonia added; this throws down the principal part of the morphia, and the filtered solution being treated with a slight excess of potash, will afford a precipitate of the codeine. This precipitate is to be dissolved in weak ether, which on evaporation will afford fine crystals. Care must be taken not to use too great an excess of potash, or a too concentrated solution of it, as in either case the codeine will be redissolved; it is therefore preferable to leave a little morphia in the precipitate, as this can be separated in the treatment with ether.

The black viscid liquid which was laid aside for examination, was found to contain a large proportion of crystallisable principles, which I found very difficult to separate. The plan I finally pursued was a simple one, but was the result of a great number of trials, in which I was assisted by Mr. Dubose, one of my pupils, with great zeal and perseverance. The black viscous liquid was evaporated to the consistence of a soft extract; alcohol was added, of 24° B.; a separation took place; one portion remaining insoluble, whilst another was

taken up. The insoluble parts consisted of ammoniacal salts, sulphate of potash, and black extractive matter. The alcoholic solution contained meconine, narceine, and much codeine; all however contaminated with a black matter, which it was necessary to get rid of; this was effected by adding a fresh portion of alcohol of  $38^{\circ}$  to  $40^{\circ}$ , and continuing to add it as long as any precipitate was formed; the black matter was partly dissolved in the weak alcohol, and was precipitated on the addition of the concentrated spirit; this retained in solution the meconine, and the organic alkalies in the state of hydrochlorates. As to the narceine, it was remarkable, that although very soluble in strong alcohol, it was almost wholly carried down with the extractive matter. To separate it, the precipitate was treated with alcohol  $40^{\circ}$  B. and at a boiling temperature, the extractive matter became indurated, whilst the narceine was dissolved; the hot solution was filtered, and afterwards distilled to separate the excess of alcohol; the remainder, on cooling, afforded the narceine in a crystalline state.

The separation of the morphia, meconine and codeine dissolved by the cold alcohol, was effected by the method previously described. The mode of operating just spoken of, will permit the manufacturing chemist to derive much advantage from those mother waters of morphia, which have hitherto been considered of no value; it is also applicable, with slight modifications, to the dark coloured mother waters resulting from the process of Dr. Gregory; considered in a scientific point of view, it is of interest, as it confirms the existence of narceine, and tends to demonstrate that the codeine of M. Robiquet is really an immediate principle of opium, and not the product of a reaction. In fact, one of the surest modes of ascertaining whether a substance exists in a formed state in an organic product, and is not the result of a reaction, is to endeavour to obtain it by different modes of operating; by menstrua, which cannot react on the elements of the original substance, and by agents whose reactions are diametrically opposed to each other. If, by these means, an identical substance is separated, it may be assumed as certain, that it existed in a formed state.

## IV.

*Treatment of the Alcoholic Mother Waters of Morphia.*

After having examined the ammoniacal mother waters of morphia, obtained by the process of Sertuerner, I next passed to the investigation of the fluid known under the name of alcoholic mother waters.

It is well known, that on the addition of ammonia to a watery solution of opium, that a grayish, flocculent precipitate takes place if the fluid be cold, and a granulated one when the solution is hot; this is impure morphia. Before purifying by crystallisation, it is usual to macerate in cold diluted alcohol, to free it from the colouring matter. According to the process of M. Robiquet, the *magnesian precipitate*, containing the morphia, is also subjected to a maceration in alcohol; these are what I term the alcoholic mother waters; liquids that are always neglected, yet they merit attention.

I took them after they had deposited all the morphia and narcotine that would spontaneously separate, saturated them with hydrochloric acid, and subjected them to evaporation; by this means I obtained a crystalline mass, which afforded me much morphia, and some codeine, which I separated by ammonia and potash. I shall not dwell on the steps of this process, as they have heretofore been explained, and will only remark with regard to the codeine, that it is extraordinary to discover it in morphia *precipitated by ammonia*; I have often observed, that if the ammonia does not precipitate pure codeine from its acid solutions, and particularly from its solution in hydrochloric acid, the partial precipitation of a certain quantity of it will take place under peculiar circumstances, and that it is often carried down with the morphia; I have found that ammonia will always precipitate codeine from its solution in acetic acid. I may here also mention a substance which will be more particularly spoken of hereafter, under the name of *Paramorphia*, a substance I obtained by treating opium with lime. This substance, which cannot be confounded with codeine on account of its insolubility in potash, accompanies the morphia in these mother waters, and is precipitated with

it, when ammonia is added; but can be readily separated by means of ether or weak alcohol, which readily dissolve it.

I sought in vain for meconine in the precipitate by ammonia. M. Couerbe states that he has found it; perhaps I washed the precipitate too much before macerating it in the alcohol; when it is present, it is to be separated by converting the precipitate into hydrochlorates, and treating with ether, the salifiable bases of opium not being soluble in this fluid in the state of hydrochlorates.

In another experiment, I treated the crude morphia with sulphuric ether, and obtained narcotine, morphia, codeine and paramorphia.

## V.

### *Examination of the substance found by M. Dublanc, and described, Annales de Phys. et Chim. XLIX. I.*

In a memoir on opium, published in 1832, but read in 1826 before the Royal Academy of Medicine, M. Dublanc, jr. announced the discovery of a new substance which was crystalline, and soluble in both alcohol and water. M. Couerbe regarded this substance as identical with one detected by himself, whilst working in my laboratory, and thus consented to share the honour of the discovery of meconine with M. Dublanc. Since that period, however, I have entertained some doubts whether the substance of M. Dublanc really was meconine. This gentleman states that it contains azote, that it differs from narcotine by containing more hydrogen and less carbon, that it affords ammoniacal products on distillation; now, meconine does not contain azote, it is volatile; M. Dublanc who heated his substance in a tube, found that it did not volatilize, neither was any change of colour produced on the addition of sulphuric acid, a change which is so characteristic of meconine; in fact, his description of its properties more nearly allies it to codeine. However, he has not shown whether it was alkaline, or formed salts; it differs also from codeine in the form of its crystals and its solubility. What, therefore, is this substance?

To decide the question I repeated the process of this chemist, and implicitly followed the method he employed to obtain his crystalline matter. M. Dublanc evaporated the ammoniacal mother waters of morphia, dissolved the residue in alcohol, obtained an alcoholic extract, treated this extract with ether, evaporated the solution, obtained an acid matter, dissolved it in water, saturated the acid with *sub carbonate of soda*, and procured two distinct substances, one white and granular, the other brown, which he removed by very cold and weak alcohol, used in small quantities, and finally purified the white substance by dissolving it in alcohol and crystallising it.

By acting in this mode, I obtained a crystalline substance which did not appear to me to be homogenous, I therefore somewhat modified the operation; the matter left on the evaporation of the ether, was dissolved in water and purified by animal charcoal; the fluid which was *acid* was slightly evaporated, and suffered to stand for twenty-four hours in a cool place. It afforded crystals which were evidently meconine; having separated these, I added carbonate of soda, and thus procured a granular precipitate, which when purified, gave me crystals having all the characters of codeine.

It is therefore highly probable that the substance described by M. Dublanc was a mixture of meconine and codeine, which will explain its peculiar properties and actions.

## VI.

### *Researches on the extraction of Morphia by means of Lime. Paramorphia.*

Oxide of calcium (lime) is often employed to obtain the vegetable alkalies; in some cases even, lime is to be preferred to the more energetic alkalies, as potash, soda, or ammonia, for these salifiable bases often retain a portion of the vegetable alkalies in solution, and exercise an action which tends to modify or alter them. Being anxious to ascertain if lime might not be advantageously substituted for ammonia in the extraction of morphia, I determined to make a trial on a large

scale. Five kilogrammes of opium were selected for this purpose, and the operation confided to M. Thiboumery, the head of my establishment.

A solution of this opium was well filtered and treated with milk of lime; the precipitate that ensued was washed with pure water, till it came away colourless. The calcareous residue was dried in a stove, and treated with boiling alcohol; but to my great surprise, no morphia was afforded either by the cooling of the alcohol or by its evaporation. Astonished at this result, we examined the washings, and found that they contained much more lime and were much more alkaline than common lime water, and moreover that they contained morphia. To separate the morphia, they were saturated with hydrochloric acid, when on the addition of ammonia, very pure morphia was obtained. Not being satisfied with this, and desirous of ascertaining the nature of the substances dissolved in the alcohol; this was evaporated, giving a granulated, brown mass; this, treated with ether, was partly dissolved, leaving a large proportion of a black extractive matter; the ether on spontaneous evaporation, afforded a brown crystalline mass which adhered to the sides of the vessel. This substance was rendered purer and whiter by dissolving it in an acid, precipitating by ammonia and recrystallising in alcohol or ether. This is the substance I have called *Paramorphia*, because it presents a complete analogy in composition with morphia; though it appears perfectly distinct from that alkaloid.

Paramorphia is white, scarcely soluble in water, of an acrid and styptic rather than a bitter taste. It is very soluble in alcohol and ether, even when cold, and still more so when aided by heat; in the latter case, very little of it separates on cooling. By spontaneous evaporation, it crystallises in needle-like crystals.

The weak acids dissolve it; the alkalies precipitate it from its solutions; an excess of alkali does not redissolve it, except the alkaline solution is much concentrated; its acid solutions never afford crystals; on evaporation yellowish scales only are obtained. It melts at  $150^{\circ}\text{C.}$ , is not volatilised at a higher

temperature, but becomes decomposed like the vegetable alkalis.

Paramorphia differs from morphia in not being reddened by nitric acid, by not forming crystallisable salts with the acids, and not striking a blue colour with the salts of iron.

Paramorphia resembles codeine in its solubility in alcohol and ether, in its alkalinity; but differs in never forming large crystals, in not forming crystalline salts, and in always being precipitated from its acid solutions by ammonia; finally, in not melting and forming oily drops.

Paramorphia has no analogy with meconine and narceine. The only substance with which it might be confounded is narcotine; and, in fact, they cannot be distinguished without the closest attention is paid to their differential characters. There are none of those marked points of dissimilarity, either in their external appearance or chemical reactions, so useful in the discrimination of bodies. At the same time the difference of taste, fusibility, solubility in alcohol, are sufficient to separate those two products.

Narcotine crystallises in prismatic needles of a remarkable brilliancy, paramorphia in granulated crystals, or very short needles; narcotine has a purely bitter taste, paramorphia a bitter taste also, but leaving a styptic and metallic impression on the mouth; narcotine requires about 100 parts of cold or 25 of hot alcohol to dissolve it, and always crystallises on the cooling of a saturated solution; paramorphia is soluble in 10 parts of cold alcohol, and in a much less quantity of boiling. The action of concentrated acids on paramorphia, has not been thoroughly examined, but enough has been ascertained to distinguish it from narcotine. Nitric acid poured on narcotine almost instantly dissolves it, becoming of a beautiful yellow colour; when it is added to paramorphia, this latter becomes yellow, but not of so decided a tint as narcotine; it softens, and melts, as it were, before it is dissolved. Hydrochloric acid also converts paramorphia into a soft and resinoid substance, before dissolving it.

Two years since, I made an analysis of it, assisted by M.

Couerbe, and have lately repeated it, with precisely the same results as regarded the carbon and hydrogen, but obtained rather less nitrogen.

<i>Paramorphia.</i>		<i>Morphia, (LIEBIG.)</i>
Carbon	71,310	72,20 = 2 atoms.
Hydrogen	6,290	6,24 = 36 “
Nitrogen	4,408	4,92 = 2 “
Oxygen	17,992	16,66 = 6 “

The analyses of morphia by different able chemists differ much more from each other in their results than the above.

As paramorphia does not form crystallisable salts with the acids ; it has not been possible for us to determine its capacity of saturation, which would have thrown much light on the subject.

As it would be very interesting to ascertain the action of paramorphia on the animal economy, I transmitted some to M. Majendie, who kindly undertook a series of experiments with it.

## VII.

### *Analysis of Opium collected in France.*

The presence of morphia in the capsules of the poppy raised in France, has lately been announced. M. Tilloy, of Dijon, and M. Petit, of Corbeil, have both given interesting notices of this fact ; but few have attempted to obtain opium. That of which I am about to give the analysis, came from the estate of General Lamarque, at Eyres in the Department of Landes.

This opium is not an extract made from the capsules, it is the juice derived from incisions, and dried in the open air. Sometime before his death, General Lamarque transmitted a specimen to M. Caventou, who was kind enough to present it to me.

This opium is of a very dark reddish brown colour, when dry it is brittle, its taste resembles that of Smyrna opium; on solution it leaves less residue than the Asiatic opiums.

Sixty grammes were dissolved in distilled water; the small



insoluble residue on being examined, was found to be composed of the usual constituents, except that there was *no trace of narcotine*; the caoutchouc was in less proportion than in Smyrna opium. The watery solution was heated to 100 C. and precipitated with sub-carbonate of ammonia. The granular precipitate was washed, dried and then treated with sulphuric ether. The ethereal tinctures on being evaporated, afforded a slight layer of an oily substance, *but no narcotine*. The precipitate was then dissolved in boiling alcohol, and purified by means of animal charcoal; on cooling, it afforded 5.39 grammes of beautifully crystallised morphia.

The ammoniacal mother waters were then boiled, and treated with hydrochlorate of lime; a precipitate took place formed of carbonate and meconate of lime. This precipitate treated by an excess of hot but not boiling hydrochloric acid, was dissolved, and on the cooling of the solution gave 2.25 grammes crystallised bi-meconate of lime. The mother water of the first precipitate on being evaporated presented a crystalline mass which was partly soluble in alcohol, the insoluble portion proved to be sulphate of lime, whilst the soluble was formed almost entirely of hydrochlorate of morphia, representing 0.78 grammes of this base. I paid particular attention to this hydrochlorate, and endeavoured to discover in it, those principles always to be met in Turkey opium, viz. narceine, meconine, codeine and paramorphia; with the exception of codeine I was unable to detect them; this may have arisen from my having operated on too small a quantity; I had at the same time evident traces of codeine.

The formation of a marked quantity of sulphate of lime on the addition of the hydrochlorate of this base, would seem to indicate that in French opium, the morphia is in part united with sulphuric acid, as has been noticed by M. Dupuis in Turkey opium. If I had possessed more of this opium I would have pursued my researches still farther; but at the same time several interesting facts are deducible from what has been done: It has been seen that French opium is richer in morphia than Turkey opium, as 60 grammes gave 6.17

grammes of pure morphia, whilst a comparative analysis of the same quantity of Smyrna opium only afforded 4.25 grammes of the alkaloid. Five hundred grammes or one pound would therefore afford 51 grammes or about 12 drachms of morphia, whilst the same quantity of Smyrna opium would only give 40 to 45 grammes or about 9 drachms. The French opium is therefore richer in morphia than the Turkey, but contains no narcotine.

As however, the presence of narcotine in opium is rather an inconvenience than an advantage, this absence of it renders the French opium more valuable. Although I ascertained the presence of codeine in our native opium, I was unable to determine the proportion in which it occurred.

As the *Papaver somniferum* and *P. orientale* grow perfectly well in France, even in poor soil, their seeds being used in large quantities in the manufacture of poppy oil, this notice may induce cultivators to turn their attention to the subject of opium, and thus open a new field of industry.

## VIII.

### *Facts respecting Narceine.*

We have already given, what we consider as the best process for obtaining narceine, but to have it perfectly pure, it must be dissolved in a very weak solution of caustic potash, at nearly a boiling heat, the solution filtered, and a slight excess of acetic acid added; the narceine crystallises on cooling, and the morphia, if any be present, remains in solution in the acid liquid.

In my first memoir I considered narceine to be an organic alkali. But the above experiments and many others of a similar character have proved to me that although acids favour its solution, they are never saturated by it. When crystallisation takes place in an acid solution of narceine, the crystals are found to be pure narceine.

I have said that the mineral acids of a certain strength, (but not so powerful as to destroy it,) strike a blue colour with narceine; I have since ascertained that this blue colour is mainly dependant on the quantity of water combined with the nar-

ceine. Thus, if a current of dry hydrochloric acid gas is passed through narceine, this substance will absorb the acid, and become of an orange yellow colour; if a little water be added it will assume a beautiful blue tint; a larger quantity of water will dissolve it, and the colour will disappear, and if the acid be now saturated with a few drops of ammonia, the narceine will be precipitated in an unaltered state.

Iodine combines with narceine; this combination is of so deep a blue that it appears black, but if it be mixed with some inert white substance, it becomes of a magnificent shade of blue. It is a real combination; if water be added and the mixture boiled, it dissolves without colouring the liquid; on filtering it promptly, the narceine separates of either a blue or a rose colour, in the latter case retaining less iodine. Finally, if the boiling be continued, the narceine crystallises of its original colour, retaining no iodine, which remains in the fluid. The rose coloured combination, which may be termed a sub-ioduret of narceine, may be procured by taking the blue ioduret, and macerating it in a solution of bicarbonate of potash. If the carbonate or caustic potash be employed, the whole of the iodine will be taken up. Hitherto starch was the only substance which struck a blue colour with iodine. It is remarkable that a substance so different from starch in its nature and properties, should produce an analogous result. This fact should induce us not to place exclusive reliance on the use of reagents in determining the nature of a substance.

The action of bromine, and especially of chlorine on narceine, is more complicated; and I shall refrain from speaking of it, until I shall be enabled to publish the researches I have undertaken on the actions of halogene bodies on vegetable substances, and particularly on the vegetable alkalies.

## IX.

*Note on pseudo-morphia, followed by some considerations on the detection of morphia by reagents.*

I give the name of pseudo-morphia to a singular substance I obtained from opium, treated on a large scale, without my

being able to assign a reason. I have only succeeded in procuring it three times. Is this substance the result of a reaction of various agents on morphia or narcotine, the two products of opium to which it bears the greatest analogy? I do not think so; at least I have never been able to form it from those two bodies. Is it owing to some other vegetable juice mixed with that of the poppy, in the country in which the opium was collected? This, I am of opinion, is still more unlikely; for the resemblances in nature and properties between this substance and morphia, would seem to indicate that one is formed from the other, either naturally or from some disease of the plant. Be this as it may, the quantity of this substance I have obtained at different times, has permitted me to study it closely, and to describe it in such a manner, that it can never be mistaken.

Some varieties of opium, on precipitation by ammonia from their solution in water, furnish a morphia mixed with much narcotine; this morphia, even when rendered white by several crystallisations, still retains narcotine, if not treated in a particular manner. It was from a morphia thus mixed with narcotine, that the substance under consideration was obtained in my laboratory. After having treated the morphia by a solution of caustic potash to dissolve it, and to leave the narcotine, the solution was saturated with sulphuric acid, and the morphia precipitated by ammonia; after filtration, the fluid, which was slightly acid, was evaporated, when it precipitated a whitish, micaceous substance; this was collected on a filter, and washed with distilled water. To render it more pure, it was re-dissolved in boiling water; on cooling, it crystallised in micaceous scales; the mother water retained a little sulphate of soda. In this state, cold water at 14 C. dissolved only 0.0013 of its weight, and boiling water 0.008, which crystallised on cooling. If a little ammonia be added to the boiling solution, this substance loses its pearly lustre, becomes less soluble and parts with  $\frac{8}{100}$  of sulphuric acid.

This substance, as has been shown, is almost insoluble in water. It is still less so in absolute alcohol and in ether;

alcohol at 36° B. dissolves a large proportion; aqua ammonia has very little effect upon it, but the solutions of potash and soda dissolve a large quantity; on saturating these solutions with an acid the substance is precipitated, but retains a little of the acid; the diluted acids somewhat aid its solution, but present considerable differences in this respect; thus, sulphuric and nitric have little influence, hydrochloric more, and acetic a still greater. Concentrated sulphuric acid gives it a brown colour, and alters its properties; concentrated nitric acid produces the same action as on morphia, giving it an intense red colour, and finally changing it into oxalic. But the most singular property of this substance, is, that it becomes of an intense blue colour with the per salts of iron, and especially the hydrochlorate of the peroxide; it is also remarkable that this colour disappears on the addition of an acid. The affinity of this substance for iron is so great, that whilst it resists the solvent power of sulphuric acid, and is only slightly soluble in hydrochloric acid; the hydrochlorate of the peroxide of iron dissolves it freely; the solution is of a bright blue; when heated, it becomes of a dirty green; if ammonia be added, a slight precipitate takes place, and the fluid assumes the colour of red wine. Somewhat the same phenomena occur, when morphia is treated in a similar manner.

In making comparative experiments on morphia and this new substance, I was enabled to elucidate some points connected with toxicological researches of great interest. First, the discovery of a substance which enjoys two of the most characteristic properties of morphia, and yet which *is not poisonous*, namely, that of becoming red with nitric acid, and that of striking a blue colour with the salts of iron, should render toxicologists very circumspect, as even when they find these characters, they ought not to positively assert that morphia is present; to do which, as in cases of other poisons, the substance should be obtained in an isolated state. I will also add, that the absence of these phenomena should not prevent the experimenter from pursuing his researches, as circumstances may prevent their manifestation. In fact, I have re-

marked that some of the combinations of morphia, as the hydrochlorate, and the acid sulphate, were scarcely tinged of a blue colour on the addition of the hydrochlorate of the peroxide of iron, especially when this contains an excess of acid. In this case, I place the combination suspected to contain morphia, on a piece of glass, add a drop of ammonia, and permit the fluid to evaporate spontaneously; after this the salt of iron will act on the morphia.

To return to pseudo-morphia; this substance, when heated, is not volatilized, nor is it entirely fused, as it decomposes as it begins to soften; when distilled in a glass retort, it affords a little oil, a small quantity of slightly acid water, from which potash disengages ammonia, and leaves a voluminous charcoal which is totally consumed when heated in the open air.

I analyzed pseudo-morphia with great care, and repeated my experiments several times; in this analysis I was assisted by M. Walter, a young, but able and expert chemist.

The results were:

Carbon,	52.74 = atoms	54
Hydrogen,	5.81	36
Nitrogen,	4.08	2
Oxygen,	37.37	14

By calculation:

Carbon, atoms	54 =	2066.74 =	53.41
Hydrogen,	36	225.00	5.81
Nitrogen,	2	117.64	4.57
Oxygen,	14	1400.00	36.19

On referring to the analysis of morphia already given, it will be seen how far pseudo-morphia differs from that substance.

Being anxious to ascertain its action on the animal economy, I sent a portion to M. Majendie, and also myself administered half a gramme to a rabbit, which did not appear to be affected by it.

If pseudo-morphia is not morphia, may it not be some combination of this base, (which, however, I do not believe) in which it loses all its poisonous properties?

P. S. My memoir had already been presented to the Academy of Sciences, when that of M. Couerbe, partly on the same subject, appeared in the *Annales de la Physique et Chimie*. I therefore determined to print mine, without alteration. I shall not enter into a discussion with M. Couerbe on the few points on which we differ; these slight differences are almost inevitable. One passage, however, requires notice; M. Couerbe attributes the discovery of Paramorphia to M. Thiboumery, forgetting that at this time I was engaged in a series of researches on the constituents of opium, which were directed by M. Thiboumery with great sagacity, but always in concert with me, and according to my orders. M. Couerbe also forgets that before either he or I, (I am uncertain which, for M. Couerbe was at that time in my laboratory,) thought of passing a current of carbonic acid through the lime-water containing morphia, I had ascertained that morphia really existed in this solution, and could be precipitated by ammonia, if the liquid was previously acidulated with hydrochloric acid.

I am ignorant why M. Couerbe has given the name of Thebaine to paramorphia; this name would seem to indicate that this substance is only met with in Egyptian opium, whilst Turkey opium contains it in the largest proportion. At the same time, I am indebted to M. Couerbe for his having verified my discovery of two new substances in opium—narceine and paramorphia, and for having added many interesting facts to the history of this latter substance, which appears to play an important part in the action which opium exercises on the system. In fact, hitherto it has been difficult to account for the excitement produced by opium in conjunction with its other effects, as it could not be attributed to narcotine, morphia, or codeine. From the following communication from M. Majendie it would appear to be owing to paramorphia.

“I have experimented with your two substances; pseudo

morphia appears to exert no action on the animal economy. This is not the case with paramorphia, which acts *tetanically* in doses of a grain. It is difficult to distinguish it in this respect from brucia, or even strychnia; though I have not compared its relative activity with these two substances. It *tetunizes* and kills dogs in a very short time when injected into the jugular vein or pleura, in doses of a grain. I do not, therefore, see any benefit in the new substances as remedies, though the analogy of the physiological action of paramorphia with that of strychnia, merits attention."

It follows from the above:

1st. That there can be no doubt of the existence of the two new principles discovered by me in opium,—narceine and paramorphia.

2d. That the codeine detected by M. Robiquet is not the result of a reaction; that from the same portion of opium, we may obtain narcotine, morphia, narceine, meconine, codeine and paramorphia.

3d. That paramorphia is one of the most active principles of opium.

4th. That the crystalline substance described by M. Du-blanc is a mixture of codeine and meconine.

5th. That pseudo-morphia is a substance sometimes to be met with in opium, but that at present we are ignorant under what circumstances it is produced.

6th. That the French opium, collected in the Department of Landes, is richer in morphia than Turkey opium; that it also contains codeine, but is destitute of narcotine.

*Journ. de Pharm. Nov. 1835.*



## MISCELLANY.



*Adulteration of Musk.*—Mr. Periera, in his lectures on *Materia Medica*, states that at the present time, musk is not much adulterated, though sand, stones, &c. are sometimes found in it. He also thinks that where musk pods show the marks of having been sewed, that this has been done to prevent the loss of the musk, rather than to close an aperture which had been made for the purpose of introducing impurities.

One of the best tests for genuine musk is, that an infusion of it does not precipitate a solution of corrosive sublimate. Both Berzelius and Geiger lay great stress on this test. Dr. A. T. Thomson, however, asserts exactly the reverse of this. Other tests for the purity of this article, are, the precipitation of an infusion of genuine musk by the acids, especially the nitric; by sugar of lead and infusion of galls.

*London Med. Gaz. Dec. 1835.*

*Essence of Musk.*—Take of grain musk fourteen drachms, or of the membranes of the musk pods, seven ounces; boiling water half a pint. Digest until cold, then add rectified spirit of wine, six and a half pints; sub-carbonate of potash, half a drachm.

*Ibid.*

*Caoutchouc.*—At the meeting of the British Association, 1835, Dr. Dalton stated the results of his examination of the spirit distilled from caoutchouc. He found it to depress the barometer like sulphuric ether. It passes through water without diminishing its volume; thus differing from ether. It is absorbed by water like olefiant gas. It consists of 2, olefiant gas; 10 volumes, when burned, give 40 carbonic acid, and require 60 of oxygen.

*Edin. New Philos. Journ. Oct. 1835.*

*Compounds of Tin and Platinum.*—At the same meeting, Mr. Kane described two compounds of tin and platinum, formed by the action of protochloride of tin on a solution of platinum. One of these compounds consists of an atom of each chloride. It deliquesces in the air; it is a dark solid substance when anhydrous, and when allowed to remain in the air is converted into an olive liquor, which is resolved into the oxides by the action of water. The author also suggested that tin is a good test for platinum.

*Ibid.*

*Nicotine.*—Mr. Davy described some experiments made by him in reference to the relative values of Virginian and Irish tobacco. He procured nicotine by simply digesting the leaves in potash, and then distilling. A liquid possessing uniform qualities passed over. This liquid, when acted upon by acids, afforded salts having a sharp, biting taste. The effects of this liquid on animals were those of a powerful narcotic. He found that one pound of Virginian tobacco was equivalent to two and one-third of Irish; the root containing four or five per cent. of nicotine.

*Ibid.*

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*Corrosion of Lead Pipes.*—Mr. Moor mentioned a curious fact in reference to the corrosion of lead pipes. The worm of a still used for preparing medicated waters, was exhibited, which was corroded completely through its substance, at points where it had been supported with wood and tied with twine. At these places a black substance was formed, consisting of oxide and chloride of lead. It was obvious that the effect was to be attributed to galvanic action.

*Ibid.*

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*Per oxide of Iron.*—Dr. Barker advises the separation of this by means of acetate of potash. This salt, when added to a solution of a per salt of iron, precipitates the per oxide when this liquid is boiled. It would, he thinks, be an excellent mode of separating iron from manganese.

*Ibid.*

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*Hydrocyanic Acid.*—Dr. Geoghehan has suggested the advantage of employing the double salt of iodide of potassium and bityanide of mercury, for the purpose of detecting hydrochloric acid in hydrocyanic acid. Sulphuric acid is frequently met with in hydrocyanic acid, but the distinction between these two acids is readily made by means of nitrate of barytes. The peroxide of mercury, usually employed for testing the purity of hydrocyanic acid, is ambiguous in its action, as it is generally impure. The use of this salt is not applicable to the alcoholic hydrocyanic acid.

*Ibid.*

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*Ferro-cyanate of Quinia.*—M. Bertazzi has given the following process for obtaining this salt. Take one part of sulphate of quinia, which is to be triturated in a glass mortar, so as to reduce it to a very fine powder; then add this to one part and a half of ferro-cyanate of potassa dissolved in seven parts of boiling water; after they have been well mixed, pour the compound into a vial, and expose it to a sufficient heat to cause ebullition, shaking it from time to time. The solution lets fall a substance of a greenish yellow colour, and of an oily consistence. After decanting the fluid, this precipitate is to be well washed in distilled water, and then dissolved in concentrated alcohol, and subjected to a heat of about 100° F.,

then filtered and slowly evaporated; this will afford a crystalline mass, corresponding to three-fourths of the quinia employed. When dried, it is of a greenish yellow colour, and very bitter taste, first giving the sensation of quinia, and then of hydrocyanic acid. It is partially decomposed by cold water, and completely so by hot; it then forms two salts, the one soluble, the other insoluble. It is very soluble in boiling alcohol.

*Annali universali de Med.*

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*Biniodide of Mercury.*—Dr. Inglis says that the biniodide falls in the form of a rich red powder when solutions of the bichloride of mercury and hydriodate of potassa are mixed together, and in this form it is generally seen. He has, however, he states, procured it in pretty large crystalline cubes, by the following process. He found that it was dissolved in great abundance in a boiling solution of hydriodate of zinc. He therefore added the biniodide till no more could be taken up, and then placed the saturated solution under the exhausted receiver of an air pump; in a short time the biniodide began to be deposited, and soon assumed the form of large regular cubes. The hydriodate of zinc that remained was capable of dissolving a fresh quantity of biniodide, or of re-dissolving that which was crystallised from it; the crystals contain no zinc.

*Lond. & Edin. Philos. Mag. Jan. 1836.*

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*Ointment for the cure of Itch.*—Dr. Emery highly extols the following ointment in the treatment of itch. Take of brown soap one ounce, table salt half an ounce, sulphur half an ounce, alcohol one drachm, vinegar two drachms, chloride of lime half a drachm. One-fourth to be used in friction morning and evening. It has the advantage of never causing any accidents or anomalous eruptions; of not soiling the clothes; of not being unpleasant; of curing the disease in a short time, and of being very cheap.

*Amer. Journ. Med. Sci. & Bull. Gen. de Therap.*

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*Ointment for enlarged Tonsils.*—Dr. Cerchiari considers the following ointment as very efficacious in the cure of enlarged tonsils. R Iodin. pur.  $\mathfrak{z}$ i, ung. Rosar.  $\mathfrak{z}$ i. M. To be applied to the tonsils morning and evening, by means of a small brush. By the end of two months these glands will, he asserts, under this application, return to their normal size. It is necessary that the inflammation should be entirely subdued before recourse is had to this ointment.

*Ibid and Journ. de Conn. Med. Prac.*

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*Lacker for Tin.*—Take eight ounces of amber, two ounces of gum lac, melt them in separate vessels, and mix them well together; then add half a pound of drying linseed oil. Into a pint vial put half a pint of spirits of turpentine, and digest in it a little saffron; when the colour is

extracted, strain the solution and add finely powdered gum tragacanth and annatto, in small quantities at a time, till the required shade of colour is produced; mix this colouring matter with the melted resins, and agitate well till a perfect union takes place. If this varnish be laid over silver leaf or tinfoil, it will be difficult to distinguish it by the eye from gold. It is applicable to leather, paper, or wood; also to tin-plate articles.

*Mechanics' Mag.*

*Beet Sugar in France.*—A hectare of land (nearly  $2\frac{1}{2}$  acres) sown with beets, produces, on an average, 2,400 kilogrammes of roots, or about 47 cwt. 36 lbs., and there are many instances where a single grower raises from 80,000 to 90,000 kilogrammes (6,260 to 7,098 cwt.) The cultivation costs about 8 shillings (\$1 75) the 100 kilogrammes (20 cwt.) The quantity of sugar extracted by the present process is about seven or eight parts of saccharine matter from 100 parts raw root.

*Arcana of Science*, 1835.

*Pomatum to prevent the hair from falling off.*—The following preparation, which was recommended by Dupuytren, is said to be very effectual in preventing the loss of hair. Macerate a drachm of powdered cantharides in an ounce of spirits of wine, and filter. Ten parts of this tincture are to be well incorporated with ninety parts of lard.

*American Journ. Med. Sci.*

*Acetum Opii Sedativum.*—Mr. Horne has recommended the following formula for the preparation of this article. Take three times the quantity of the best opium, reduced to fine powder, that is ordered by the London Pharmacopœia for two pints of tincture; add to the opium two pints of dilute acetic acid; after they have digested a few hours, add to them six or eight pints of rectified spirits of wine, macerate about seven days, then carefully filter in order to separate the insoluble parts of the opium. Introduce the liquor into a retort accurately closed and distil off the spirit. The product in the retort will be the *acetum opii*. If the distillation be carefully conducted, the result will always prove of one uniform strength; one  $\text{m}$  being equivalent to three  $\text{m}$  of tinctura opii, and free from spirit, and will keep unchangeably for a length of time. It will be found the same, or very similar to Mr. Battley's *Liq. opii sedativus*, (except the strength, which latter falls short, according to the opinion of our most able experimenters, as nearly 1 to 2, instead of 1 to 3,) a preparation too well known to require describing, except in regard to its mode of formation, which the preparer, in spite of his ranking as a scientific druggist, has hitherto kept a profound secret.

The rationale of this process may be briefly stated as follows: The acetic acid unites with the morphia of the opium, and forms an acetate

of morphia, which is held in solution by the diluted acid; the remaining ingredients of the opium, acted upon by the spirits of wine are extracted, and detained by the acid, after the spirit has been distilled off.

*Ibid, and London Med. Gaz.*

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*Purgative for children.—*

R	Ol. Tiglii	gtts. ij.
	Sacch. alb.	ʒij.
	Gum Arab.	ʒss.
	Tinc. Cardam.	f. ʒss.
	Aqua distill.	ʒi. ʒij. M.

This mixture is to be administered in doses of two desert spoonfuls, every three or four hours, till the bowels are sufficiently acted upon. It is of an agreeable taste, and may be advantageously given to the youngest children; but of course in diminished doses, according to the age.

*Journ. de Pharm.*

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*Brilliant white light for Signals.—*

Nitre,	24 parts,
Flowers of Sulphur,	7 parts,
Red sulphuret of arsenic,	2 parts,

These substances are to be thoroughly incorporated, and pressed lightly into boxes of six inches in diameter, by three in height; the flame lasts for three minutes. It can be seen at a distance of 30 or 40 miles.

*Ibid.*

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*Castoreum.*—Mr. Pereira states that the following are the principal differences between American and Russian Castor. In the latter, the sacs are smaller and more rounded than in the former; they are also compressed. Colour, ash brown. Odour, remarkable and peculiar, differing from the American. It is empyreumatic, or like that of Russian leather. Internal appearance, brownish fawn, and quite dull, with no shining or resinous lustre. American castor softens under the teeth like wax, and has an acrid taste; whereas Russian breaks down like starch, has but little taste at first, and then becomes somewhat bitter and aromatic. One of the best discriminating tests, is to drop a piece about the size of a pea into diluted muriatic acid; no obvious effect is produced on the American, whereas the Russian effervesces. The tincture of the Russian is of the colour of dark Sherry wine, whilst that made with the American is nearly as dark as London porter. When added to water, the former produces but a slight milkiness, scarcely altered by aqua ammonia; the latter renders the water very milky and strikes a bright yellow with ammonia.

*London Med. Gaz.*

*Chloruret of Lime in Gonorrhœa.*—Professor Graefe, of Berlin, states that he has succeeded with this article where copaiba and cubebs have failed. He used it in pills and injection. The pills are made as follows:

R	Chlor. calc.	ʒi.
	Extr. opii,	gr. ix.
	Mucilag. Gum Arab.	q. s.

Of this, fifty four pills are to be made. At first, one is to be taken every two or three hours, and the dose gradually increased till eight, ten, or twelve are taken every hour. The injection is made by dissolving gr. xxiv. in water ʒvj., adding vin. opii ʒss.

*Trav. Soc. Med. Bourdeaux and Amer. Journ. Med. Sci.*

*Indigo in Epilepsy.*—Dr. Ideler, of Berlin, asserts that he has obtained beneficial results from the administration of powdered indigo in epilepsy. He administers it in the following manner:

R	Powdered indigo,	ʒss.
	Aromatic powder,	ʒss.
	Syrup,	q. s. to make an electuary.

This is at first to be taken in two days, and afterwards in one. The dose of indigo may be increased to six or eight drachms a day. According to the author, the first effects of the remedy are nausea and vomiting; sometimes it produces a diarrhœa, which soon ceases, and is followed by constipation; the urine becomes of a brown colour.

*Journ. de Chim. Med.*

*Gallic Acid.*—Dobereiner says that gallic acid may be rapidly prepared by mixing a concentrated decoction of nutgalls with a little acetic acid, to decompose the gallate of lime, agitating with ether, which takes up most of the gallic acid, evaporating this solution to obtain the gallic acid, which is thus procured in a very short time, in the form of small colourless prisms.

*Pharm. Tech. Rath.*

*Mode of detecting some Organic Acids.*—H. Rose has discovered that tartaric, paratartaric, citric and malic acids may be readily detected in the following manner: they are to be dissolved in as small a quantity of water as possible; to this solution an excess of completely saturated lime water is to be added.

Tartaric and paratartaric acids form precipitates in the cold state. That produced by tartaric dissolves completely in a small portion of solution of ammonia, whilst the paratartaric remains insoluble. Both acids are readily distinguishable by treating their solution with sulphate of lime; after some time lime is deposited in that of paratartaric, whilst that of tartaric is not affected.

A solution of citric acid yields no precipitate with lime water in a cold

state, but when heated, a copious deposit takes place. If a small quantity of a very dilute solution of citric acid is mixed with lime water, a precipitate takes on boiling the mixture, and is again taken up as the liquid cools.

A solution of malic acid occasions no precipitate with lime water, either in a hot or cold state.

*Dublin Journ. Med. and Chem. Sci.*

*Lotion for pustular eruptions on the face.*—Dr. Siemerling advises the following as useful in pustular eruptions on the forehead and face :

R Sweet almonds,        ℥j.

Bitter        “        ℥iv.

Make an emulsion with distilled cherry water, (*Kirshenwasser*;) ℥x.—add

Corrosive sublimate,        gr. vj.

Tincture of benzoin,        ℥vj.

Lemon juice,        ℥iv.

Whenever the eruption is washed, the lotion must be well shaken.

*Journ. de Pharm.*

*Anti-syphilitic solution.*—Dr. Werneck has found the following very prompt and effectual in the cure of recent cases of syphilis :

R Deuto-bromide of mercury gr. i.

Sulphuric ether        ℥i.

The dose of this solution is 10 to 20 drops in barley water, a short time after taking dinner. A solution of the deuto-bromide of mercury in distilled water (6 grs. to the pint of water) forms a good wash for chancres. When the ethereal solution is employed internally, the strictest attention must be paid to the diet.

*Ibid.*

*Crystallised Barium.*—P. Muratori states that crystallised barium may be readily obtained, by passing a stream of ammoniacal gas through a solution of hydrochlorate of barytes, until the water of the solution is saturated; the hydrochlorate is decomposed, and the barium is deposited in a crystallised state. He adds, that by the same process calcium may be also obtained in a crystallised form.

*Journ. de Chim. Med.*

*Deliquescent Salts.*—Mr. Druchar recommends to pour a few drops of oil of turpentine in the bottle in which they are to be kept, and the crystals introduced after the air has been thoroughly impregnated with the vapour.

*Ibid.*

*Aromatic honey of roses.*—

R Petals of red roses,        3 lbs.

Rose water,        16 lbs.

Place the whole in a still, and apply heat; continue the process till 12

ounces of a very aromatic fluid have passed over. Take the residue, strain it through a flannel and express; then filter through paper. This filtered liquid is to be mixed in a basin with ten pounds of well clarified syrup of honey, and the whole boiled till it marks 31° of the hydrometer for syrups, when it is to be withdrawn from the fire, and the 12 ounces of liquid obtained by distillation added to it; the mixture is to be again strained. This is an excellent preparation, very astringent, of a fine red colour, and perfectly transparent. *Journ. de Chim. Med.*

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*Opiate for Gonorrhœa.*—Dr. Berton gives the following formula as very effectual in the treatment of Gonorrhœa.

R	Bals. copaibæ,	
	Pulv. Cubebæ,	aa ʒij.
	Alumenis	ʒi.
	Extract opii,	gr. v.

Incorporate the whole carefully, so as to form a homogenous mass. Of this, one drachm is to be taken night and morning in the pulp of a prune, and the dose rapidly increased to two drachms, morning and evening. The author disapproves of injections, till the running has diminished and the disease remains in a stationary state. *Gazette Med.*

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*Creosote Pills.*—Dr. Reich, of Berlin, has found the following pills very beneficial in acute rheumatism. R Creosote, ʒi; Pulv. Rad. altheæ, q. s. f. pill. ex. Four or five to be taken morning and evening.

*Amer. Journ. Med. Sci. and Hufeland Journal.*



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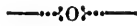
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JULY, 1836.

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**ORIGINAL COMMUNICATIONS.**

ART. XIII.—APPARATUS FOR MAKING INFUSIONS. By ROBERT ALSOP, London, Honorary Member of the Philad. Coll. Pharm.

A MORE uniform and effective mode of preparing the medicinal infusions than that in common use, together with some simple means for their preservation, so as to admit of their extemporaneous use, have long appeared to me problems of some importance in practical pharmacy. My time is so much engaged in other concerns as to leave little leisure for scientific pursuits, except in those departments which the ordinary course of business presents; I have pleasure, however, in contributing my mite, through the medium of this Journal, towards the advancement of my favourite study.

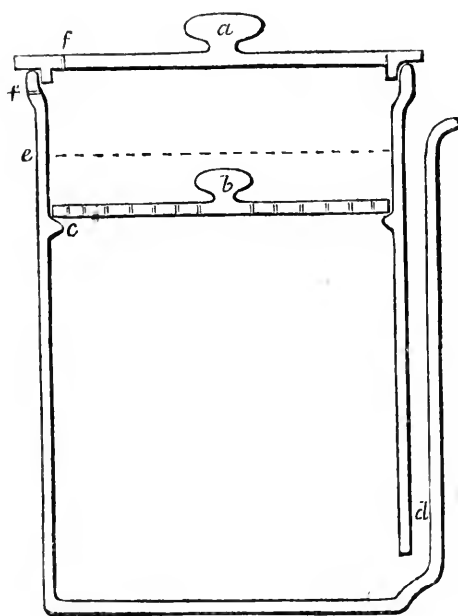
Every one must have remarked, when preparing infusions in the common mode, without repeated agitation, the appearance of a denser stratum at the bottom of the vessel, highly charged with the soluble and active part of the substance employed; this dense solution cannot but obstruct the complete extraction, by cutting off contact with the unsaturated portion of fluid, and I have endeavoured to present the medicinal substance under circumstances to which this objection will not apply.

To this end, I propose the use of an earthenware vessel, similar in construction to one that I have myself employed

a rough section of which I subjoin. This jar should be rinsed with boiling water before each time of using, to avoid loss of heat as much as possible; the ingredients to be infused are then to be placed upon the perforated plate, and boiling water poured over them; employing a vessel of such dimensions that the required quantity may sufficiently overtop the ingredients after allowing for the portion likely to be absorbed. During the maceration, the contiguous fluid becoming charged with soluble matter, sinks through the perforations, and unsaturated water will supply its place as long as any thing further remains which water has the power of dissolving. It is of great advantage to maintain the maceration at a gentle heat, which is readily accomplished by placing the vessels upon a heated plate near the fire, as the top of an iron oven, &c. &c., which also renders convenient the application of my mode of preserving them. This consists *in the removal of atmospheric pressure*, and with it the greater part of the air, generally present in a state of diffusion or solution in the water, by which the seeds of the cryptogamous byssi, or mould, which commonly form in infusions, are developed and supported. With this view, when the maceration has continued the time prescribed, the infusion should be strained *while hot*, and immediately transferred to bottles, provided with accurately ground stoppers, which are to be made perfectly *full*; allowing the stopper to displace its own bulk of the liquid. I secure the stoppers from being mismatched by tying each to its own bottle by a piece of string of convenient length. As the infusion cools, a partial vacuum is formed by its contraction, which is the more complete the higher the temperature at which it is bottled, and the freer the infusion from diffused air. The same object may be effected by the use of a common bottle and perforated cork, closing immediately the aperture from which the displaced fluid escapes, by sealing it with sealing-wax. On this principle I have for several months preserved my infusions with great facility and advantage; and by the latter mode, with corks, I preserved Infusion of Cusparia from the fourth month, (April,) of last year until with-

in a few weeks of the present time—a period of about nine months, comprising the whole of a hot summer. When opened, it was found quite free from mould or putrescence, perfect in odour and taste, and fit for use.

I am aware that this principle has long been acted upon in the culinary department, for the preservation of unripe gooseberries, &c., and that a somewhat similar mode has been patented, for the preservation of dressed meats, soups, &c.; but I am not aware of its having been heretofore applied to pharmaceutical purposes, in which I apprehend it admits of extensive application.



(a) The lid.

(b) The perforated plate on which the substance to be infused is to be placed.

(c) A ledge which supports the plate.

(d) A spout which rises close to the side, to prevent it from being broken off.

(e) The water line.

(f) String-holes, by which the lid may be tied to the jar.

## ART. XIV.—ON POLYGALA SENEGA. By RICHARD PRICE.

(*Extract from Inaugural Thesis.\**)

SUPPOSING, from the analogy in the appearance of the internal structure of the senega and ipecacuanha, that similar treatment might extract their active principles, I submitted a quantity of the root to the process for procuring Emetia, and also to several modifications of it, without obtaining anything satisfactory.

A fresh portion of the senega was then boiled in successive portions of alcohol, until it came off tasteless; the residue was boiled in water as long as this extracted anything. The tincture and decoction were both filtered while hot, and after cooling, were evaporated to dryness. The tincture deposited as it cooled, a yellow substance, supposed from examination to be wax. [No. 1.]

The extracts were then submitted to the following experiments:

*First.* The alcoholic extract was treated with ether, in successive portions, to remove some fatty matter which floated on the surface of the tincture, when nearly evaporated. By afterwards evaporating the ether, it left a brown residue, having an extremely nauseous smell and taste, and separable into two distinct substances; one a greenish yellow, semifluid oil, soluble in cold alcohol and ether, insoluble in water, not appreciably volatile, though when heated, giving off a slight smell resembling senega. The other, a dark brown, nearly solid fatty matter, insoluble in cold alcohol or ether, soluble in those fluids when boiling, and precipitating as the solution cools.

\* We owe it to the authors of this, and the subsequent paper, to state that the only reason for their omission in the last volume, was owing to our having mislaid the extracts we made, soon after they were placed in our hands.



*Second.* The residue, after treatment with ether, was digested in cold alcohol, by which a portion of whitish matter was precipitated. The clear tincture was evaporated to dryness, [No. 2,] with the intention of dissolving in water for further examination: but having noticed in the January number of the Journal of the Philadelphia College of Pharmacy, a process for preparing hyoseyamine, and, judging from my former experiments, it might answer with senega, I submitted the alcoholic extract to some experiments founded on that process.

1st. The extract of No. 2 was boiled in alcohol; the solution by filtering, left nearly half the extract, which was insoluble in alcohol, of an intensely acrid taste, and nearly colourless. [No. 3.]

The clear solution was concentrated in a water bath, and digested with lime, which was removed, and dilute sulphuric acid added in slight excess: the solution still remaining very dark, was treated with lime and sulphuric acid as before. After the separation of the precipitates, and further concentration of the solution, an excess of carbonate of soda in powder was added, which, together with the precipitate occasioned by it, were pressed from the mother water, and boiled in alcohol of 41 degrees Baumé; the solution filtered, and the mother water treated with boiling ether, which, when filtered, was added to the alcoholic solution, both being turbid and of a yellowish green colour. Lime in powder was added, which precipitated some yellow colouring matter, leaving the solution green. The lime was separated by the filter, and the solution boiled with washed animal charcoal, filtered and evaporated to dryness. The residue was nearly insoluble in cold water, partially soluble in alcohol and ether, the residue soluble in water, appearing like sugar. The alcoholic solution evaporated, the residue has a slight acrimony with a sweet taste resembling good liquorice; the ether appears to have dissolved only some resinous matter.

2d. The mother water, after treating with ether, still having a somewhat acrid taste, was boiled in alcohol, which dis-

solved but a small portion of it; the solution, freed from insoluble matter, was treated with lime and sulphuric acid, as before, then with carbonate of soda, and alcohol; the substance obtained was precisely similar to that from No. 1.

3d. The precipitate No. 2, was treated with boiling alcohol, which dissolved a yellow substance analogous to wax, leaving a black insoluble substance, which burned without flame, leaving a small, white residue.

4th. The precipitate No. 3, being insoluble in either cold or hot alcohol, or ether, was dissolved in boiling water. The solution reddens litmus, forms a brownish precipitate with solution of sulphate of iron, but not with gelatine. A portion of it, treated with lime and dilute sulphuric acid, becomes gelatinous as soon as a slight excess of acid was added. Neither the solution or precipitate retaining any acidity.

5th. Another portion of the third precipitate, dissolved in water, was boiled with magnesia, filtered, and on adding dilute sulphuric acid, became gelatinous; but was redissolved by adding a slight excess of magnesia, then filtered to separate the magnesia, and evaporated to dryness. The dry mass, boiled in strong alcohol, the solution filtered, had the taste and sensible properties of senega, precipitating as it cooled, a white substance, leaving the liquid green; this, when evaporated, left a greenish white residue, insoluble in ether, soluble in alcohol and water, which developes more strongly the acidity of the substance. The solution being neither acid nor alkaline, was slowly evaporated to dryness, leaving the substance unchanged. The precipitate also tasted slightly acid, but was so small I could not separate it from the filter.

The active principle, in the impure state in which I have obtained it, appears to be neither acid nor alkaline, is soluble in water and alcohol; insoluble in ether; is not precipitated by alkalies or their carbonates; precipitated by subacetate of lead and sulphuric acid; forming with the latter a gelatinous mass, insoluble in alcohol or water.

## ART. XV.—ON SOME PREPARATIONS OF IRON.

BY JAMES HOPKINS.

*(Extract from Inaugural Thesis.)*

*Sulphate of Iron.* All the pharmacopœias give formulas for its preparation, but differ much in regard to the quantities of the articles employed. Those of the United States and London direct eight ounces of iron and eight ounces of acid. To this there is no material objection; there is, however, an unnecessary excess of iron. I have found by experiment that eight ounces of acid are completely neutralized by four and a half ounces of iron.

No more water should be used than is really necessary, as in proportion to the weakness of the solution the evaporation is prolonged; under any circumstances, water in weight equal to nine times that of the acid employed will be sufficient; and where a moderate degree of heat can be retained in the solution until it is filtered, a still smaller quantity will answer.

The effervescence generally ceases before the acid is entirely neutralized; it may be renewed by a slight application of heat. If the solution contain but little sediment, it may be clarified quickly by passing it through a funnel, in the neck of which is slightly pressed a portion of cotton.

The evaporation of the liquid requires some caution, for if it be exposed to too high a temperature it becomes charged with a reddish yellow precipitate, (the subsulphate of the peroxide.) A long exposure to even a moderate temperature produces the same effect. It should be placed in a broad, flat dish, and submitted to an even temperature of about 180° of Fahrenheit; the crystals should be perfectly dried and put into a glass stoppered bottle. The French pharmacopœia of Ratier asserts that the sulphate of iron (of commerce,) which contains the sulphates of copper and alumina, may be purified by boiling the solution with pure iron filings, straining and

crystallizing. This may do for copper and alumina, but will not answer for many other impurities.

Among the preparations into which it enters, are the compound iron mixture, and the compound iron pills of the pharmacopœia; the former being similar to the celebrated antihectic mixture of Dr. Griffith of England, the latter composed principally of the same ingredients, intended as a substitute for the mixture—the latter are pretty generally prescribed in this city. The directions given for making them are hardly explicit enough.

They are: Take of myrrh in powder, two drachms; carbonate of soda—sulphate of iron, each one drachm; syrup a sufficient quantity; rub the myrrh with the carbonate of soda, then add the sulphate of iron, and again rub them; lastly, beat them with the syrup so as to form a mass, to be divided into eighty pills.

When the carbonate of soda and the sulphate of iron, in crystals, are mixed with the myrrh, it is very difficult to powder them, the sulphate more particularly; much of which, as the mixture becomes moist by trituration, remains in coarse particles, defended from the action of the pestle by the myrrh.

I have, in making them, usually powdered the several ingredients previous to mixing. In moist weather, the addition of syrup is unnecessary, sufficient water of crystallization being afforded by the mutual decomposition of the salts to form a pillular mass.

*The Precipitated Carbonate of Iron.*—When a solution of carbonate of soda is mixed with one of the protosulphate of iron, a double decomposition ensues, and a precipitate (white if a pure protosulphate is used, but green if the sulphate in its ordinary state is employed,) is formed, which is a protocarbonate of iron in combination with water. By exposure to the air it loses the water, and most of the carbonic acid, and acquires oxygen from the air, forming a reddish brown peroxide, united with a variable quantity of protocarbonate of iron.

The formulas of the different pharmacopœias, as in the case

of the sulphate, vary considerably in the relative proportions of the ingredients used in its formation. The United States pharmacopœia orders six ounces of carbonate of soda, to eight ounces of sulphate of iron; the Edinburgh, five ounces of carbonate of soda to four ounces of sulphate of iron; and the Dublin, twenty-six parts of carbonate of soda to twenty-five parts of sulphate of iron.

In making a portion, I found the precipitation to be continued after I had added eight ounces of carbonate of soda to eight ounces of sulphate of iron in solution, being two ounces more than is ordered by the United States pharmacopœia. From this result, I would suggest that equal quantities of the two salts be used.

Great difference in the colour, and, according to Mr. Phillips, in the composition of the product is caused by slight variations in the process for making the precipitate.

According to Mr. Phillips, when precipitated in hot water, washed in hot water, and dried by steam, it contained 14.5 per cent. of carbonic acid, and was of a chocolate brown colour; when dried in the air it contained the same quantity of carbonic acid, and was of a yellowish brown colour; when precipitated in cold water and dried by steam it contained one per cent. of carbonic acid, and was of a reddish brown; when dried in the air, no carbonic acid, and was of a yellowish brown colour.

In repeating some of Mr. Phillips' experiments I have found the difference in colour of the several products to be very considerable. But the quantity of carbonic acid, though evidently greater in the product of the first mentioned process, did not differ as widely from that of the latter as in Mr. Phillips' experiments.

It cannot be of great consequence which process is followed, but as the first is the most convenient, and as the product contains the highest proportion of carbonic acid, (to which some think the activity of the preparation is proportioned,) it is to be preferred. Eight ounces of each of the salts in crystals yield about three ounces of the precipitate.

*The Muriated Tincture of Iron.* Whenever iron is administered in the liquid form, the tincture of the muriate is the preparation usually resorted to. It possesses, in addition to its properties as an active chalybeate, that of being acceptable to the stomach, and easy of administration. There can be no just reason for its variance in strength, as is frequently the case; much circumspection is certainly required in its preparation; but when due care is taken, it will generally be obtained of nearly the same strength.

There are several causes that may influence its preparation; any difference in the strength of the acid, allowing the base to be always the same, must necessarily vary the product; any mixture of the peroxide of iron, obtained from the protosulphate by heat, with the base, may vary the strength. Equal quantities of two tinctures, one made from the precipitated carbonate and one from the peroxide, obtained from the protosulphate, yielded for the first 40 grains of peroxide of iron, and for the latter, 17 grains. Exposure to the air is likely also to weaken the tincture. The protoxide of the protomuriate being changed by the absorption of oxygen to the peroxide, which, requiring a larger proportion of acid for saturation, is partly precipitated; there is more or less of this precipitate according to the quantity of protomuriate in the tincture.

A tincture made from a peroxide resulting from the precipitated carbonate, deprived of its carbonic acid by heat, did not precipitate during several weeks exposure.

The only certain test of its strength is to ascertain the quantity of peroxide it contains. This may be done by adding a solution of caustic potash to a given quantity of the tincture, until it ceases to precipitate. The peroxide is thrown down in the form of a bulky hydrate; this is to be thoroughly washed and dried. 1000 grains of the tincture, made according to the national pharmacopœia, yielded 79 grains of the peroxide of iron. This very nearly agrees with Mr. Phillips' test of a tincture prepared by himself.

Mr. Phillips states that muriatic acid of the officinal specific

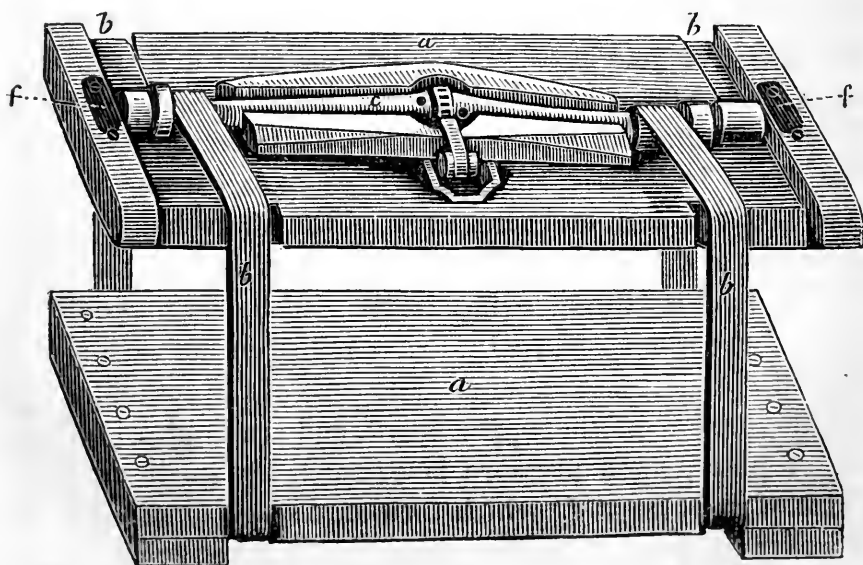
gravity, dissolves all the precipitated carbonate directed except one scruple. I have never been able to make it take up more than five and two-thirds ounces. Indeed if it did take up the whole, it should yield a somewhat larger proportion of peroxide than it really does.

The muriated tincture of iron is used in medicine in almost all the cases where a chalybeate is advisable.

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ART. XVI. ON A PORTABLE BOTANICAL PRESS. By ROBERT PETER, M. D., Lexington, Ky., Correspondent of the American Journ. Pharm.

THE idea of this press was suggested by seeing one from Cincinnati, made by Dr. LOCKE, upon which this is a manifest improvement. It is intended for pressing and drying plants on botanical excursions; and supercedes the old plan of boards with straps and buckles.





(a. a.) Boards 12 by 18 inches, with battens on the ends.

(b. b.) Straps passing under the lower board to make the pressure by being rolled around the spindle *c*. These straps are of very strong woollen webbing, such as the saddlers use in the construction of reins, &c.

(c) Spindle of iron, with a ratchet wheel in the centre, having holes in which to place the end of the handle *d*, in order to turn it around. The spindle is protected by strips of wood, and partly let into the upper board. An improvement on this plan is represented at *e*. The spindle is made of hard, tough wood, with a brass tube, bearing the ratchet wheel, driven on the middle, through which the holes for turning it are made. The straps instead of rolling up in four places, are rolled up in two, one at each end; the ends of the straps being merely tacked on to the wood of the spindle. In this form the straps may be two or three inches wide. In the iron spindle the ends of the straps are wedged into holes cut on each side of the collar, represented as at *c'*. The ends of the spindle are let into the batten on the upper board, and are kept from flying out of place, when pressure is exerted, by small moveable plates of iron, (as at *f*,) which turn on a screw at one end and fit under the head of another screw at the other end.



## ART. XVII.—MEDICO-BOTANICAL NOTICES. No. X.

*Passiflora*.—This extensive and beautiful genus of plants is almost peculiar to tropical countries, very few of its species being found in the more temperate regions. They are all climbing plants, with alternate, simple, generally lobate leaves, and axillary flowers, which are succeeded by a sort of apple or pepo, of a pleasant and refreshing taste, on which account they are much esteemed in warm climates. From the beauty and peculiarity of their flowers, they are also an object of interest to the horticulturist.

In a medical point of view, they likewise deserve attention, as some of the species are endowed with energetic properties, more especially the *P. quadrangularis*, a native of the isle of Bourbon, but extensively cultivated in the West Indies for the sake of its fruit, which is considered as one of the most grateful of the tropical productions, having a luscious, but at the same time a subacid taste.

The root is long and slender, having a blackish epidermis; the cortical portion is of a claret red colour, and the wood of a yellowish white. When fresh, it possesses an odour somewhat resembling that of the radish; its taste is acrid and astringent, without bitterness. According to Dr. J. B. RICORD MADIANNA, (*Ann. Lyceum Nat. Hist. New York* i. 129,) this root, in a fresh state, is a violent acro-narcotic, acting rapidly and energetically on the brain; this he attributes to a peculiar principle which he has called *Passiflorine*, but it does not appear certain that the deleterious properties depend solely on the presence of this body, but rather on a more volatile constituent, which is dissipated on drying the root, for it has been satisfactorily shown that it loses all its poisonous qualities by age. An infusion has been recommended for the expulsion of tæniæ, but, added to the danger attendant on its use, its anthelmintic powers are very problematical.

The *P. rubra*, a native of Jamaica and other of the West

India islands, also appears to be endowed with somewhat the same characters. Dr. WRIGHT, (*Med. Plants, Jamaica*,) states that the roots and young shoots are a poison to hogs, and also that a Dutch physician in Jamaica employed the flowers as an anodyne with great advantage; this property was confirmed by other practitioners who found them a mild and safe opiate in fevers, where opium itself was inadmissible. The mode of administration is to infuse twenty-four of the blossoms in hot water; this infusion, when cold, to be taken in two doses; twelve of the berries eaten produce the same effect. It is evident, however, that great caution is requisite in the employment of this remedy, as from its poisonous effects, an overdose might be attended with serious consequences.

The flowers of another species, the *P. fœtida*, are also esteemed as efficacious in catarrh and other diseases of the respiratory organs, and an infusion of the stems is said by POUPEE DESPORTES to be a powerful emmenagogue.

No trials have been made with our native species, though it is probable from their virose smell, that they will be found analogous in their properties to the above.

We have noticed these plants from the fact that DECANDOLLE has stated that "no species of the Passifloreæ is employed in medicine, nor does it appear that they are endowed with any striking properties," and LINDLEY says that nothing is known respecting their qualities except the edible character of the fruit.

*Cerbera*.—In a late notice of the *C. Tanghin*, (*Am. Jour. Pharm.* i. 190,) we stated that it was the most virulent vegetable poison known, but omitted to say that it is the *Tanghinia venenifera*, DUPETIT THOUARS. POIRET, however, considers that it is identical with the *C. manghas*. The nuts have been analyzed by HENRY, jr., and found to contain a limpid, mild, fixed oil, a peculiar crystalline substance, extremely poisonous, (*Tanghine*) &c. &c.

All the other species, seven of which are enumerated by

PERSOON, also appear to be highly poisonous. The *C. thevetia*, a native of the West Indies, has been experimented upon by Dr. MADIANNA, (*Ann. Lyceum Nat. Hist.* i. 86,) who found the juice highly energetic, causing death in animals in a short time, with all the symptoms produced by the acro-narcotics. He is of opinion that the active principle is hydrocyanic acid, but it is more probable that its powers are owing to the presence of the peculiar substance above alluded to. DESCOURTILZ states that two grains of the bark are equivalent to a full dose of cinchona, in the treatment of paroxysmal fevers. (*Flor. Med. des Antilles*, iii. 40.)

The *C. ahouia*, found in Brazil, is said by ORFILA to bear a very poisonous nut, acting powerfully in small doses as an emetic, and in larger quantities producing death. The *C. manghas*, a native of several parts of the East Indies, has long been known as a medicinal agent. According to AINSLIE, (*Mat. Ind.* ii. 260,) it is the *Manghas lactescens Burmann*, (*Zeyl.* 150 t. 79 f. 1,) and *arbor lactaria*, RUMPHIUS, (*Amboyn.* ii. 243, t. 81,) who speaks of the bark being eminently cathartic. It also appears to be the *C. salutaris*, LOUREIRO, (*Flor. Coch. Chin.*, i. 134,) and is noticed by HORSFIELD, (*Asiatic Journ.*, March, 1819;) he states that the leaves and bark are considered by the Javanese as active purgatives, and that the fruit is externally applied as a cataplasm in diseases of the skin. When taken internally, this fruit produces symptoms closely resembling those caused by stramonium.

*Anacardium occidentale*.—This tree is a native of the West Indies, where it attains a height of from twenty to twenty-five feet. Its fruit, which is known under the name of *Cashew apple*, is very peculiar, as this apple is nothing more than a large, pyriform, succulent receptacle, which supports a reniform nut of about an inch in length. The apple is edible, having an agreeably rough and sweet taste. The nut is covered with a hard but brittle shell, between which and the kernel is a very bitter and caustic oil, which, when applied to the skin, causes an erysipelatous eruption; it is very vola-

tile, for in roasting the nuts, if great caution be not used in avoiding the fumes, they will produce swelling and inflammation of the face. The kernel itself is perfectly bland, and somewhat resembles a chesnut in taste.

The shell of the nut was analyzed by CADET, and found to contain much gallic acid, tannin, an extractive matter, a gum resin and a green colouring principle. This resin has been examined by M. DE MATTOS, (*Journ de Pharm.* xvi. 625.) He states its taste is acrid and caustic, and when applied to the skin produces immediate vesication, and might advantageously supply the place of cantharides, where strangury is feared. It has also been given internally as a drastic purgative in doses of two grains; in smaller quantities, it acts as a stimulant to the gastric organ. It can be readily procured by treating the nutshells with alcohol, evaporating and washing the residue with hot water, to remove any gallic acid or tannin.

But this tree is still more interesting for the gum which it furnishes in considerable abundance. It is stated in the *Jamaica Phys. Journ.*, that it resembles the finest gum Arabic, is almost transparent, of a light straw colour, perfectly tasteless and brittle. LONG (*Hist. Jamaica*) says that a tree "annually transudes large quantities, viz.—ten or twelve pounds" of this gum.

*Rhus metopium*.—This species is found in many of the West India islands; and, according to DESCOURTILZ, (*Flor. Med. des Antill.* ii. 49) is used as an astringent in diseases of the bowels; a gum also exudes from it, which is known in Jamaica by the name of *Hog gum*, and is said by a writer in the Journal above quoted, to be a useful demulcent in various forms of disease, especially colica pictorum, and disorders of the respiratory organs; some cases are cited of its efficacy in these complaints, which show that it is evidently a valuable article, and deserving of further trials. The mode in which it was administered, was by mixing one teaspoonful of the fresh juice with two ounces of boiling water, the dose of which was a teaspoonful every fifteen or twenty minutes. In large

doses it acts as an emeto-cathartic. It retains its properties for a considerable period, if prepared in the following manner:—to every two ounces of the gum add an ounce of boiling water, stir well, and mix with half an ounce of strong rum, strain and keep in a well closed bottle. The dose is a tea-spoonful.

*Ionidium Marcucci*.---In the last volume of this journal we gave a short notice of this plant, since which we have been favoured by Dr. HULINGS with dried specimens, a drawing of the plant, the report made to the Colombian government on the subject, and also with the description published to aid the search for it. As every thing relating to this plant is of importance, if on further trial it should be found to fulfil the high powers attributed to it, we have also inserted a memoir by Dr. BANCROFT, which gives a condensed view of all that is known respecting it.

In this paper, as before mentioned, he considers the plant to be a new species differing from the *I. parviflora*, and the drawing in our possession agrees perfectly with his description, as do the specimens received from Dr. MUTTER, and one of those from Dr. HULINGS, labelled as coming from Riobamba, where Mr. MARCUCCI obtained it. On the other hand, the official description referred to, terms it *I. parviflora*, and describes that plant, added to which most of the specimens accompanying it, are certainly different from the plant of Dr. BANCROFT, being fruticose and not procumbent, with smooth peduncles,—thus agreeing with the *I. parviflora*.

It is, however, highly probable that they are possessed of identical properties, as it is well known that the roots of all the species of this genus are emeto-cathartic in an eminent degree, and produce precisely the train of symptoms attributed to the *Cuichunchilli*.

*Coulteria Tinctoria*.—According to Dr. MACFADYEN, (*Jamaica Phys. Journ.*, April, 1834,) this plant, which is a native of several parts of South America, has been introduced

into Jamaica, where it has thriven even in the most parched and arid spots. As this shrub is tolerably hardy, it would in all probability succeed in many parts of our southern states, in situations in which scarcely anything else would grow. In Jamaica it soon comes into bearing, and its crops last through a greater part of the year.

The pods which are similar to those of the *Cæsalpinia coriaria*, contain tannin and gallic acid in very large proportions, and may hence be used not only as a substitute for oak bark in tanning, but also are capable of supplying the place of the best Aleppo galls.

R. E. G.

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ART. XVIII.—REMARKS ON SOME COMMON IMPURITIES IN MEDICINES, AND THE MEANS OF OBVIATING THEM.

By Wm. R. FISHER, Baltimore.

*Plumbi Acetas.* The best crystallized and whitest specimens of this salt in commerce contain much carbonate of lead and dirt, and are unfit for internal administration as medicine. Hence it has long been a practice with me to recrystallize and refine the crude salt, (if this term be allowable,) before dispensing it as a medicine. It has been asserted as an ascertained fact, that the acetate of lead, when pure, does not produce lead disease, or rather that the *carbonate* is the only direct poison of lead;\* if this be true, there is a direct responsibility incurred by the pharmacist, who through ignorance or neglect furnishes to his customers an acetate of lead containing so noxious an agent. The internal use of lead during the prevalence of the Cholera in this city in 1834, was very extensive, and the experience of one physician at least, who freely administered it, confirms the opinion that pure acetate of lead does not produce lead poison. I do not, of

\* Ducatel's Abridgement of Christison, p. 148.

course, propose to confirm or deny the assertion, but I do unhesitatingly affirm that the commercial sugar of lead is unfit for medical use; and hence I wish to impress upon those whose business it is to dispense prescriptions, that it is a matter of duty with them to re-crystallize and purify even the best *looking* salt which they can buy; the operation is attended with little expense, and trouble should be no consideration with the faithful pharmacist, who is fully sensible of the responsibility involved in the exercise of his profession.

*Sulphate of Zinc.* This is a highly useful member of the Materia Medica, and one which is as frequently employed as almost any other; very frequently for internal use. Some experience has satisfied me that it can seldom, if ever, be bought pure, even in its best looking condition. Tincture of galls will almost invariably show the presence of iron in it. Hence the pharmacist who would vend a pure article must either make it for himself, or purify the commercial salt; if he adopt the former plan he will obtain, from the formula of the United States Pharmacopœia, a handsome, pure article, by careful crystallization, rejecting the latter portions of his mother waters. The latter mode, that of purifying the salt of commerce, is attended with more trouble, and is perhaps quite as expensive; the iron must be separated either by immersing sheets of zinc in the solution required to be purified, which after a long time will decompose the sulphate of iron and precipitate its oxide; or the same object may be accomplished in less time by adding small portions of chloride of lime to the solution, which, by its reaction on the water of the solution, is converted into muriate of lime, and allows the iron to become peroxidized by combining with the oxygen set at liberty when the muriatic acid is formed; the resulting muriate of lime remains dissolved in the last mother waters, which must be thrown away; the solution must be heated, and the chloride added in solution, so long as red oxide of iron falls; if any sulphate of lime be formed, being insoluble, it is separated when the solution is filtered preparatory to crystallization.

It may be objected to this, that such nicety is not required, and that the presence of so small a quantity of iron in the preparation cannot possibly injure its effects as a medicine. This may be true, or it may not; I do not intend to discuss it, and will admit that absolute purity is not so imperatively called for as in the salt before treated of; but we all profess to sell *pure* medicines, and a sulphate of zinc containing iron, is not *pure sulphate of zinc*. The time occupied in preparing this notice it is believed has been well engaged if it serve to attract the attention of any one to a fact which had hitherto escaped his notice. As to the modes recommended, the author speaks from his own experience with them.

*Carbonate of Soda.* The extensive manufacture of artificial barilla, as it is called, has introduced into our markets a carbonate of soda, containing a sulphuret of soda, which is exceedingly unpleasant, to say the least. My attention was once or twice called to the smell of sulphuretted hydrogen arising from carbonate of soda, before I paid much regard to it, passing it by as the result of accident, or neglect in cleaning out the mortars after they had been used for some previous preparation; but upon one occasion when I saw that no cause of this kind could have produced it, I at once recognised the cause; at least, such a cause as was adequate, in my opinion, to account for it. Having seen no reference to this subject in any of the books, it occurred to me that it could not prove uninteresting to your readers to have some account of it. The artificial barilla of this country is made by the decomposition of sulphate of soda, by means of charcoal and lime. The effect of this combination when heated is first to convert the sulphate into sulphuret of soda, which is decomposed by the lime, leaving as the product, soda and sulphuret of lime, mixed with carbonaceous matter, of which there is always an excess. This is the theoretical effect, but in practice, some sulphuret of soda is always left, which it is found impracticable to separate, at least with due regard to the economy which prevails in large manufacturing establishments. I have



been informed that in France, when the artificial barilla is designed for the production of carbonate of soda, that means are always employed thoroughly to remove the sulphuret, and hence that French carbonate, whether made from native barilla or artificial is always freer from this contamination. From the same source I learn that the artificial barilla made in this country is all designed for the use of soap manufacturers, and that therefore the same care is not observed in its preparation; the wants of that class requiring the alkali uncombined, render but little preparation necessary in the manufacture of the barilla, and it is of course an object with the manufacturer to furnish the article at its lowest price.

This consideration should not prevail with our profession, and care should therefore be taken to avoid the unpleasant results, which might follow the employment of carbonate of soda containing sulphuret of soda.

With regard to the tests necessary to detect its presence, I should think the disagreeable odour itself would be sufficient; but at all events, the presence of any sulphuret may be made manifest with a soluble salt of silver or lead.

*Spt. Etheris Nitrici.* In preparing some of this ether a short time since, the mixture was inflamed, and burned for several minutes within the retort. The nitrate of potassa and sulphuric acid had been mixed, and when about an ounce of alcohol was poured in upon them, an explosion took place with sufficient force to throw a small glass funnel, then in the mouth of the retort, some distance; the mixture within blazed up and burned for some minutes, as I have above stated. I have never noticed any effect approaching this before, and merely note it as a caution to others who may be employed in making this preparation.

## ART. XIX.—PHARMACEUTICAL NOTICES. NO. XIV.

*Mel Rosæ.* The following is recommended in a late French publication as giving a very astringent preparation, of a good colour and consistence:

Petals of red roses	1½ pounds,
Rose water	8 pounds.

These are to be mixed, and placed in a still, heat applied, and the distillation continued until about twelve ounces of a very aromatic fluid has passed over. The residue is to be subjected to pressure, and the fluid obtained, filtered. This filtered liquid is to be mixed with ten pounds of well clarified syrup of honey, and evaporated till it marks 31°, when the twelve ounces of distilled fluid is to be added, and the whole strained.

*Peroxide of Gold.* The preparation of the peroxide of gold, for medicinal purposes, is variously advised by different authors. Thus CHRISTIEN directs (*Ann. Soc. Med. de Mont.* xxii. 166,) the hydrochlorate of this metal to be precipitated by means of subcarbonate of potash, taking care to avoid any excess. This process, however, is attended with many difficulties, as part of the gold is reduced and precipitated with the oxide, &c.

MAJENDIE recommends the use of barytes, and other chemists the oxide of zinc, but neither of these agents, it would appear from some late experiments on the subject, will afford as large or pure a product as calcined magnesia. M. COTTEREAU states that the following mode of operating will be found advantageous in every respect.

An excess of magnesia is to be boiled with a diluted solution of hydrochlorate of gold, till the solution loses its colour; the whole is then to be filtered and the precipitate well washed, the result, which is aurate of magnesia, is to be treated

with an excess of diluted nitric acid, which removes all the magnesia and leaves the oxide in a pure state. This is to be again well washed and dried between sheets of bibulous paper, but without compression or exposure to light or heat. It is pulverulent, inodorous and of a brown colour. Light acts on it very rapidly, and it must therefore be always kept in opaque bottles.

*Action of Charcoal on some of the Bitter Extracts.* The employment of charcoal as a decolourizing agent is so frequently resorted to, that it is a matter of some consequence to ascertain whether in some cases, in removing the colouring principle, it does not at the same time act on other constituents. It was several years since asserted by DUBURGA, that if the tincture of gentian be treated with charcoal, that it lost all its bitterness, whilst the tincture of centuary was not acted upon by this substance. In consequence of this statement, Dr. HOPFF made a series of comparative trials on a number of vegetable extracts, and found that whilst some remained unaffected, others were deprived of almost all their previous bitterness; this was particularly the case with chamomile, simarouba, Iceland moss, &c.

Nux vomica and false angustura were not affected by the use of small portions of animal charcoal; but if an excess be employed, and the digestion continued for some time, they lost almost all bitterness. This subject still presents a wide field for experimental inquiry, especially as regards the effect of this agent on the peculiar principles of vegetables, and more particularly on such as are remarkable for their bitterness, as quinia, &c. Dr. HOPFF does not mention whether the extract of nux vomica, thus deprived of one of its most sensible qualities, still retained its other qualities unimpaired. Might not the strychnia, in thus losing its bitterness, also lose its poisonous properties.

*Medicated Waters.*—Most of the aromatic medicated waters of the United States Pharmacopœia are ordered to be

made, by impregnating the water with the appropriate volatile oil, by trituration with magnesia. This is certainly the simplest and least expensive process for preparing them; and in many cases, the resulting article, in a medical point of view, is fully equal to that obtained by distillation; though this is not always the case, owing to the difficulty of procuring the essential oils in a pure state. In other respects, however, medicated waters made in this manner are far inferior to those procured by distilling from fresh plants, and in some cases totally different products are obtained by the two processes. Thus it has been shown by M. SOUBEIRAN, (*Journ. de Pharm.* xvi. 619,) that orange flower water, distilled from the flowers, and that made with the essential oil of these flowers, (neroli,) differed widely from each other in many important characters; as, for instance, in permanency; the distilled water retaining its odour and other properties after exposure to the air, whilst the factitious article was speedily rendered inert.

There are few pharmaceutic preparations whose nature is so little understood as the distilled waters, for though in some cases they may be nothing more than a diffusion of the volatile oil of the plant through water, it has not been satisfactorily shown whether this oil is merely in a state of infinite division in the vehicle, whether it undergoes certain changes, or lastly whether other principles may not be associated with it. In the case above cited, M. SOUBEIRAN has proved that the latter is the case, the distilled water containing an aromatic body, which that made with the volatile oil does not. Again, the distilled waters of bitter almonds, peach kernels, &c. owe their principal medicinal properties to the presence of principles which did not pre-exist in a formed state, but which were formed during the process by the combined action of the heat and water.

*Tinctura Opii.* The different Pharmacopœias of Europe and the United States agree very nearly in their formulas for the preparation of this important article, though at the first glance it would appear that the reverse is the case; their proportions are one part of opium to twelve parts of weak alcohol.

Thus the pharmacopœias of Edinburg, Vienna and Amsterdam, as well as the formulary of BRUGNATELLI, order one ounce of opium to the pound of weak alcohol. Now at Rome as well as in Great Britain, Holland and Germany, the pound, apothecaries' weight, contains twelve ounces; and hence, although the value of the pound varies much in these different countries, still as the ounce forms the twelfth part of it, the proportions of opium and alcohol remain the same.

The London, Dublin and United States Pharmacopœias order in the proportion of two ounces and a half of opium to two pints of weak alcohol, which gives almost the same ratio of twelve to one. The codex of Paris prescribes one part of the aqueous extract of opium to twelve parts of alcohol at 22°. The Lisbon formula, however, is widely different from the above; not containing much larger proportions of opium than paregoric elixir. The Danish, one part opium to forty-eight of alcohol; the Brunswick dispensatory, and that of VAN Mons, one to eight.

The relative strength of the alcohol used, is also much the same; thus the 22° B. of the French codex agrees very nearly with the diluted alcohol of the other formulas; that of the London college having a sp. gr. 0.930, or 20° B.; the Dublin, 0.919 = 21,75°; those of Edinburgh and the United States, 0.935, or 19° B. On the other hand, the Antwerp orders alcohol of 15°.

R. E. G.

*Rochelle Salts.* A quantity of epsom salts, in large crystals, having a strong resemblance in form to the crystallized tartrate of potash and soda, has lately been offered in this market as Rochelle salts. The deception is easily detected by the taste, or by adding to a solution of them carbonate of potash or soda, either of which will separate the magnesia from its sulphate. It is believed that they have been profusely crystallized in this form to deceive the unwary, and for the purposes of gain. Their history cannot be traced further than that one lot came from New York; whether they are manufactured in that city, or further eastward, is not satisfactorily as-

certained. It is due to the respectable house who purchased some of this article to say, that they immediately declined selling it as Rochelle salts, upon being informed of its true character.

It is believed that the sulphates of magnesia and soda have been frequently used to adulterate the powdered Rochelle salts and Seidlitz mixture; being mixed in such quantities with the true article as to affect the quality without changing the taste enough for the deception to be discovered in that way. The difference in the value of the Rochelle salts, no doubt, is the inducement to this unprincipled conduct.

When a lot of Rochelle or Seidlitz is suspected to be thus contaminated, it can be readily discovered by adding a small quantity of the solution of nitrate of barytes to a solution of the suspected article, a precipitate being thus formed of sulphate of barytes.

*Sup. Carb. Sodæ.* Sup. carb. sodæ is said to be adulterated by means of the sulphate of soda. Physicians and druggists should be on their guard in purchasing this article, and especially that which is imported from England. J. S.

## SELECTED ARTICLES.



### ART. XX. RESEARCHES ON SUGAR, MOLASSES, &c.

BY A. BOUCHARDAT.

ONE of the most interesting parts of chemistry, is that relating to the transformation of one immediate principle into another. If, in particular, we consider the neutral ternary principles furnished by vegetables, we discover bodies which are formed of the same elements, in proportions so nearly similar, that oftentimes, to use the words of Berzelius, we may refer the differences stated to exist, to errors of observation, we find these bodies, I say, so widely dissimilar in their physical properties that it could scarcely be supposed that woody fibre, starch and sugar belonged to the same group. But it has been found that the composition of these substances was very analogous, and their transformation under various influences into each other, has confirmed the justness of classing them together.

#### 1. OF THE SPECIES COMPOSING THE GENUS SUGAR.

All bodies which are transformed by fermentation into carbonic acid and alcohol, must be arranged in the genus Sugar, which will thus comprehend three species, 1. Cane sugar; 2. Grape sugar; 3. Mushroom sugar; Maple, Beet and Cane sugars form one and the same variety; but we shall see that there are several varieties of grape sugar.

At the present time I shall notice only the action of acids and alkalies on sugars, and of the different kinds of sugar on each other, as these are the most interesting in a practical point of view.

The following experiments will show how far I agree with

other chemists, and in what points I differ, especially with M. Malagutti, with whom, however, it is probable I should be more in unison, if he had operated comparatively on the several varieties of grape sugar.

Twenty-nine grammes of cane sugar were dissolved in fifty grammes of water, acidulated with five grammes of sulphuric acid, the whole was boiled in a water bath, at the same time with a similar mixture in which sugar of starch replaced that of the cane. A few minutes boiling were sufficient to cause a deposit of ulmic acid in the flask containing the cane sugar, whilst the solution of the starch sugar was scarcely coloured; but, after boiling for an hour, both flasks contained a deposit. The quantity of acid was too great in this experiment. I dissolved in several flasks, each containing fifty grammes of water and one of sulphuric acid; 1st, ten grammes of cane sugar; 2d, ten grammes of crystallized grape sugar, procured by the action of sulphuric acid on cane sugar; 3d, ten grammes of crystallized grape sugar, obtained from raisins; 4th, ten grammes of crystallized grape sugar, arising from the action of sulphuric acid on fecula. The deposit of ulmic acid began to form after a few minutes' boiling, in the first flask; and soon afterwards occurred in the second; a longer time elapsed before it became visible in the third; whilst in the fourth a few flakes only were perceptible after an ebullition of six hours. This experiment was variously modified by augmenting and diminishing the proportion of acid, always operating comparatively in the same water bath, and it was found that the formation of ulmic acid followed an invariable order; 1st, cane sugar; 2d, grape sugar, procured by the action of sulphuric acid on cane sugar; 3d, grape sugar; 4th, and differing essentially, sugar from starch. This experiment is remarkable, as it proves that when the decomposing effect of the sulphuric acid has been arrested for some time, as regards cane sugar, it afterwards operates on it much more slowly than if it had exercised a continued action. The elements become arranged in a more settled manner, and thus are better enabled to resist the operation of the acid. It also demonstrates that well



characterized varieties of grape sugar exist, founded on constant and positive characters.

Experiments have also proved to me that all the acids act in the same manner on the sugars, differing only in energy.

If the ultimate action of acids on the sugars is tolerably well known, it is by no means so as regards their intermediate influence; as the different changes that are induced before the formation of ulmic acid are but imperfectly appreciated.

I boiled a solution of cane sugar, made with three parts of water and  $\frac{1}{300}$  of nitric, sulphuric and hydrochloric acids; and checked the action as soon as the slightest tinge of colour began to manifest itself in either of the three flasks; the acid was then saturated with lime water, and I obtained on evaporation a white, uncrystallizable sugar, of very great sweetness, without the slightest bitterness. No signs of crystallization appeared.

I successively diminished the quantity of acid, and with the nitric even in the proportion of 0,001 obtained an uncrystallizable product.

All the fixed acids I operated with, as the phosphoric, malic, tartaric, oxalic, citric, &c., produced the same effect. It must, however, be observed, that the proportion of acid was augmented in the ratio of their saturating power, with water saturated with sulphurous acid; the action also was not fully developed if the liquid syrup was kept for any length of time. In this case I remarked the formation of crystalline plates, which were merely the rudiments of crystals of cane sugar, mixed with a large proportion of uncrystallizable syrup and acetic acid; if the ebullition be prolonged, another effect is joined to that of the acid, that of heat; if the quantity of acid be increased, there is a formation of acetates, which are with difficulty got rid of, and which deteriorate the results.

A long continued boiling of the syrup produces the same effect as the acids; but, to obtain a syrup which is wholly uncrystallizable, this action must be prolonged for upwards of sixty hours, whilst with the acids a few minutes are usually sufficient.

Thus the acids before converting cane sugar into grape sugar, transform it into an uncrystallizable sugar, having a much sweeter taste than cane sugar, from which it is made.

I also made a comparison of the alcoholic fermentations of two equal parts of cane sugar, one transformed into uncrystallizable sugar, the other not; the proportions of carbonic acid were alike in both cases.

I subjected the uncrystallizable syrup arising from the foregoing experiments to a heat of  $140^{\circ}$  for four hours, after having added  $\frac{1}{125}$  of sulphuric acid of  $66^{\circ}$ . The acid was diluted in a quantity of water equal to twice the weight of the syrup, and after being mixed with it, lime was added to saturation; the syrupy fluid lost much of its sweet taste on evaporation; it afforded sugar after having been left undisturbed for a few days; I separated the uncrystallized portions by means of alcohol; the remainder was a large proportion of well crystallized grape sugar.

This operation succeeded equally well with the other acids, their quantity being increased or diminished according to their energy; if the temperature be raised above  $140^{\circ}$  great attention must be paid to the process for reasons presently to be stated.

Acids also convert cane sugar into grape sugar, without the assistance of heat, but it requires a much longer time; this fact has been observed by all pharmacutists in their acid syrups, and is noticed by M. Boullay in his dissertation on ulmine.

If instead of  $\frac{1}{125}$  of sulphuric acid  $\frac{1}{25}$  be added to the uncrystallizable syrup, and the heat be raised to  $212^{\circ}$ , a liquid of a dark brown colour is obtained after a few minutes boiling; this liquid on being saturated with lime affords no signs of crystals; after being evaporated, it assumes the form of a brown molasses, having a bitter as well as sweet taste. It loses but little of its colour by the action of animal charcoal, and the syrup thus purified never crystallizes. The dark colour is not owing to a solution of ulmic acid in the syrup; for I have boiled this acid with sugar, and only produced a light

brown tint; it is a conversion of uncrystallizable grape sugar into a new uncrystallizable syrup, which, as will hereafter be seen, is readily obtained by acting on grape sugar by means of the alkalies.

*Molasses of commerce.* I made a comparative examination of a great number of specimens of different kinds of molasses of commerce, and found their nature very variable; they most commonly consist of a mixture of all the sugars into which cane sugar can be converted, namely: 1st, cane sugar dissolved in the uncrystallizable syrups; 2d, an uncrystallizable syrup which can be converted into grape sugar by the acids; 3d, a black, uncrystallizable sugar, resulting from an alteration of the grape sugar; 4th, in most cases there ought to be grape sugar resulting from the action of the free acids of the sugar cane, or beet on the cane sugar; but I have never been able to extract it without recourse to the use of acids; whilst with these agents, the greatest portion of the *rich* molasses, that is those containing the most cane sugar, and the first variety of uncrystallizable sugar, can be converted into grape sugar.

I should add that *heat* alone will not convert cane sugar into grape sugar; it first changes into an uncrystallizable syrup, and afterwards with time and an increase of the heat above  $230^{\circ}$ , it is transformed into the second variety, without my ever having been able to separate sugar in the intermediate state of grape sugar.

*Action of Alkalies.* To appreciate this action, great care is necessary, and all attendant circumstances are to be taken into the account. Not to cite well known facts, sugar heated with potash to a certain temperature, affords ulmic acid; and at another, it furnishes oxalic acid; in contact with anhydrous lime, it affords, as has lately been shown by Fremy, jr., acetone, metacone and carbonic acid. In fact, many of the discordant results obtained by different chemists may have arisen from a want of attention to similar discrepancies of con-

ditions. Many experiments have been made on the action of lime on cane sugar; this action is the more interesting as it is connected with all the manufacturing operations to which sugar is subjected; but the action of this base on the other kinds of sugar is less known.

The oldest experiments are those by Daniel, the proprietor of a sugar refinery at London; he announced that when a solution of lime in sugar is left undisturbed for some months, a very remarkable change takes place in it; a hydrated carbonate of lime is formed, and the solution loses its properties, changing into a jelly resembling that of starch; it requires from nine to twelve months to produce this. It is evident that the sugar experimented upon by Daniel contained foreign substances, for Pelouze has shown that the carbonic acid is furnished by the air, and that as long as any lime remains in the liquid, no decomposition of the sugar takes place; it has also been proved that a chemically pure solution of sugar is not altered by age if not exposed to the light.

Preceding chemists have studied the action of lime water at ordinary temperatures; but as it comes in contact with sugars at various degrees of heat in the manufacture of sugars, it becomes necessary to study its action under these circumstances. I have operated on all the kinds of sugar above enumerated, and may state as the results obtained, that the varieties of grape sugar all act identically with lime, hence we shall merely distinguish between cane and grape sugar.

On the 15th of January, I exposed a solution of one part of cane sugar in four parts of water with an excess of lime, in a well closed bottle, to a heat of  $110^{\circ}$ , until the 19th of March. At this time the supernatant fluid was decanted, carefully saturated with sulphuric acid and filtered; the product on evaporation afforded crystals of cane sugar. On the same 15th January a similar solution, in a carefully closed bottle, was put aside, and not examined till the 20th of September; there was no formation of hydrated carbonate of lime as in the experiments of Daniel and Pelouze, as the fluid was protected from the action of the air; the solution on evaporation furnished

crystals of cane sugar; hence the transformation noticed by the first writer was certainly not owing to the action of the lime.

So much lime is dissolved in a solution of sugar in water, that when it is saturated by sulphuric acid, it forms a solid mass from the quantity of sulphate of lime thus formed. I often employ in my laboratory this solution of lime in sugar and water, when the presence of the sugar has no influence on the desired results.

On the 6th of January, I placed solutions of the different kinds of grape sugar with an excess of lime in well closed vessels, and exposed them to a heat of  $110^{\circ}$  till the 19th of March. During the first few days, the solutions became dark coloured, and this phenomenon successively augmented; I removed the excess of lime by means of carbonic acid, evaporated the fluid, and obtained a brown extractiform mass, without saccharine taste, but extremely bitter, and which was soluble in both water and alcohol, and was not susceptible of alcoholic fermentation. I intend to study this with care, as I am inclined to believe that this substance is the antecedent to ulmic acid. It is produced during the alteration which takes place when grape sugar is converted into uncrystallizable sugar by means of acids; I have seen a very small portion of this substance render a large quantity of grape and even cane sugar, uncrystallizable.

Berzelius contradicts the assertion so generally made, that lime changes grape sugar to a brown colour, unaided by heat. The 30th January, I made a solution of 100 grammes of grape sugar in 50 grammes of water, containing an excess of lime, and suffered the mixture to remain undisturbed at the ordinary temperature, until the third of April; a slight precipitate of a rose colour was formed above the excess of lime; the fluid itself was amber coloured; by saturation with sulphuric acid, it became sensibly brown; on being filtered and evaporated, it afforded an uncrystallizable product.

All the grape sugars gave similar results; with the sugar of

diabetes not entirely pure, the calcareous deposit was of a very beautiful rose colour.

*Action of Sugars on Sugars.*—There is an experiment which has been much more thought of by adulterators than by chemists. This is crystallizing cane and starch sugar together, so as to present an uniform appearance. But the following experiments show that this cannot be done.

On the 23d of May, I dissolved 20 grammes of sugar obtained from starch in 32 grammes of water, and left the syrup to evaporate spontaneously in a hot and dry place; ten days afterwards there was no trace of crystallization. On the 20th June, crystals similar to those of cane sugar were visible in the midst of a viscous fluid, but the quantity was small.

I also boiled equal parts of cane sugar and grape sugar with animal charcoal, and obtained a perfectly clear syrup, of a pleasant taste, but not as sweet as before the operation; the mixture was left undisturbed for two months; crystallization gradually took place, and at last the whole formed a solid mass. In this case it was not the cane sugar that crystallized, but the grape; and the quantity of uncrystallizable sugar that remained, did not equal one-fifth of the cane sugar added; hence, by the mere effect of boiling, the cane sugar was transformed into grape sugar. Numerous experiments have proved to me, that the uncrystallizable sugar which remained, was a mixture of the two sugars.

#### APPLICATION OF THESE EXPERIMENTS TO THE MANUFACTURE OF SUGARS.

*Manufacture and Refining of Cane and Beet Sugar.*—I have shown that lime, even at the boiling point of syrups, exercises no injurious effect on cane sugar; these experiments clearly explain the advantageous use of it in sugar works. I have also ascertained that the soluble calcareous salts in like manner exercise no deteriorating influence; but this is not the case with acids in a state of great dilution; they first convert crystallizable sugar into an uncrystallizable white sugar, and

on the quantity being augmented, into grape sugar, and finally into an uncrystallizable sugar, which appears to result from the union of an uncrystallizable brown matter, &c. There is also another kind of uncrystallizable sugar, resulting from the action of cane sugar on grape sugar. As soon as sugar has descended one degree in the scale, there is no means of restoring it to its place; it can be still further deteriorated, and here our knowledge respecting it ceases.

It is then of the highest importance in the manufacture of cane and beet sugar, to saturate the free acids as soon as possible, to destroy their influence, and also to keep the beet roots as short a time as convenience will allow; for, as the vital force diminishes in these roots, the chemical action increases, causing a deterioration of the sugar; and this takes place much more rapidly than is generally supposed, especially if the roots contain nitrate of potash; we have already noticed the injurious effects of nitric acid, and according to Berthollet it is always found in a free state in a fluid containing a free acid and nitrate of potash. Great progress has been made in the manufacture of beet sugar, but there exists 0.10 of sugar in the roots, and only 0.6 have been obtained by the most expert manufacturers, though there is every reason to believe that uncrystallizable sugar does not exist naturally in them, but is the product of the deterioration of the root from age, or errors in the process of extraction.

*Sugar from Starch.*—If the manufacture of beet sugar has nearly arrived at perfection in France, this is far from being the case with sugar from starch. There was, till lately, nothing produced but a dark syrup of a disagreeable taste; since the researches of Biot, Payen and Perroz, however, this manufacture has much improved, and the products from Neuilly and especially those of M. Beudant, are very satisfactory in many respects.

The use of malted barley to make syrup of starch, is not as advantageous as was supposed; in fact it is very difficult to always procure malt of the same quality, and the omission of

a single precaution, may render the whole operation unsuccessful; much more syrup altered by sulphuric acid is sold for syrup of dextrine than is thought. But all the conditions necessary to full success in this operation, are not yet practised in manufactories. I will briefly enumerate them: 1st, it is better to employ a small proportion of sulphuric acid, and to prolong its action, but it must not be saturated until the transformation is complete; this may be ascertained by pouring into a small quantity of the fluid, about three times its bulk of alcohol; no precipitate should take place; 2d, the excess of acid must be saturated as soon as the transformation is complete, for if suffered to remain, it reacts on the sugar; 3d, the use of steam is much preferable to that of fire; 4th, the saturation and clarification demand particular attention; it is here that most manufacturers fail; if too much lime be added to saturate the acid, the sugar is rapidly blackened and altered; it is therefore better to leave the syrup somewhat acid than to overstep the mark. The choice of a substance to clarify the syrup much embarrasses manufacturers; some employ animal charcoal; others black schist; others again a mixture of both; but always with different results; some maintain that these agents contain either small portions of lime, or alkali, or sulphurets, and very minute quantities of either are sufficient to colour the syrup during evaporation, and to injure its crystallization. I have always employed with the greatest success the charcoal resulting from the action of potash on blood or horns, as furnished by the makers of Prussian blue; this should be first treated with muriatic acid and then thoroughly washed with water. This charcoal has a powerful decolourizing effect on starch sugar and may be purchased at a low rate, as the manufacturers have no sale for it, except as a manure.

By following the above rules, a beautiful sugar may be made, well crystallized, very white, having a purely sweet taste, and containing no uncrystallizable sugar.

*Journ. de Pharm.*



ART. XXI.—OBSERVATIONS ON THE PLANT NAMED CUI-CHUNCHULLI, AND ITS USE AS A REMEDY IN THE DISORDER CALLED MAL DE SAN LAZARO, OR COCObAY. By E. N. BANCROFT, M. D., Fellow of the Royal College of Physicians of London.

THE attention of the public throughout Columbia has of late been excited by accounts published in various journals relating to a plant named Cuichunchulli,\* which is stated to have afforded very great benefit in the disorder there usually called Mal de San Lazaro, and here Cocobay, and even to have effected its cure; and as this is one of the most deplorable diseases that can afflict the human race, and is also deemed one of the least tractable, I feel persuaded that no apology will be requisite for bringing to the notice of this meeting some authentic reports on the subject, together with such additional information concerning both the plant itself, whose botanical characters I have been able to ascertain, and its properties, as it has been in my power to collect from different quarters or by personal observation.

It appears that a Jesuit of Quito, named Velasco, a native of Riobamba, in that province, who was afterwards expelled with the rest of his brethren from the Spanish Dominions, and subsequently allowed to retire to Italy, had occupied himself in writing a history of Quito, which however he was deterred from publishing by reason of the unremitting persecution kept up against the whole order of Jesuits, particularly by the Court of Spain. At his death the work came into the hands of another Ex-Jesuit, executor to Velasco, but, from similar

\* This is the nearest approach that can be made in Spanish Orthography to the proper, *i. e.* Indian mode of pronouncing the word, but it is faulty in the penultimate syllable. It should be sounded as consisting of five syllables, and spelt for English pronunciation Coo-y-choon-jool-ye, for French, Cou-y-tchoune-djouilli, and for Italian, Cu-y-ciun-giu-gli.

apprehensions, it was never brought to light. At length, a Columbian, Senor Modesto Larrea, being in Italy, fell in with that executor, and received from him the original manuscript of Padre Velasco, which he carried back with him to Quito. Of this history some notice was soon afterwards given in a newspaper published under the title of "Gazeta de Quito," No. 33, and among other passages quoted from it was the following account of the plant already mentioned.

"The Cuichunchulli," a name signifying, in the language of the Incas, bowels of a Guinea pig, *tripa de Cuy*, "is like a small whitish slender nerve, without any leaf, that rises from beneath stones and fastens itself to their surface. There is scarcely any plant more powerful. Its virtues, though well known to the Indians, were unknown to the Spaniards until the year 1754, when an Indian, as a singular favour, revealed them to a lay-Jesuit," (*i. e.* a man-servant in a convent of Jesuits) "who was suffering under confirmed lepra" (Elephantiasis tuberculata) "with all the symptoms and appearances of a Lazar, and was considered by the physicians as being in a hopeless state. He gave him half a drachm (un. adarme) of the nerve-like filament, ground and mixed with wine, but warned him first to receive the Sacraments. Its operation, upwards and downwards, was attended with extreme agony during 24 hours, (con agonias mortales,) but the surface of his body then became clean and dry (enxuto y seco.) A few days afterwards, he began to cast his skin piecemeal, (arrojar la piel a pedazos) and recovered perfectly. Of all which I was an eye-witness (ocular testigo) in the city of Cuenca."

Some time after the publication of this extract, it was copied into a newspaper printed at Bagota in 1829, called the Echo of Tequendama, No. 5, and through this paper it came in the course of the same year to the knowledge of a practitioner at Maracaybo, Senor Manuel de Aroche, formerly a medical officer in the Spanish Army, whose desire to make trial of the Cuichunchulli induced him to request the assistance of various friends to procure it for him; but it was not till near the end of 1833 that he succeeded in getting the plant, in consequence

of an application for it which Messrs. Casanova of that city had made to their relation, Colonel Casanova at Guyaquil, from their anxiety to have the new remedy administered to one of the members of their respective family then afflicted with the Mal de San Lazaro. Immediately on receiving the Cuichunchulli, Senor de Aroche commenced giving it first to a person of colour, named Jacopo Puche, who had been long and greatly affected with the disorder just mentioned, and afterwards to Senor Angel Casanova, the individual above alluded to, and kept a journal of the principal occurrences he observed in each patient during their treatment. Of this journal a copy is before me, written and signed by that practitioner, which General Montilla brought hither from Maracaybo in March last, when on his way to England as Envoy from the State of Venezuela to the British Court, and very kindly put into my hands; and as I believe it to be the first authentic account drawn up by a professional man that has yet appeared of the effects of the Cuichunchulli in the Mal de San Lazaro, I conceive that it will be more satisfactory to the Profession generally, that the whole of this interesting document, which is of but moderate length, should be submitted to them, than that it should be suppressed or even curtailed; I therefore give it entire. It is however proper here to observe, that the package received by Messrs. Casanova from their cousin, contained no stems, leaves, or flowers, but roots only, which agreed in appearance with the description of the plant as above quoted from Velasco's history.

#### DIARY OF THE EFFECTS OBSERVED IN PUCHE.

This patient began to take the Cuichunchulli on the 17th of October, 1833, in daily doses of half a drachm of the plant in powder, diluted in two spoonsful of Sherry wine. Within a few hours of taking the first dose, there was a sensible increase in the urine and in the perspiration, accompanied with a disagreeable feeling in the epigastric region.

*18th October.*—He took an equal dose in the same vehicle

as the first, with similar effects, but in greater proportion, and two evacuations of various colours and very fœtid.

19th. The same dose in the same form; the urine was much more abundant than on the two preceding days, and the patient reckoned that he had made water about thirty times; the sweat was also copious. This day he perceived some power of feeling in his skin, which he had lost for some years; he had also the same disagreeable sensation in the epigastrium as on the first day.

20th. He took nourishment alone, having risen languid and very weak.

21st. He took seventy-six grains of Cuichunchulli in the same vehicle as before, which gave him four large and very fœtid stools of unusual colours. The urine and the sweat continued also to be abundant; there was besides observed that a large tubercle situated over the musculi gemini, (or Ischio-Spini-Trochanterianus) of the left hip had disappeared, and that a large ulcer which occupied the lower and hinder part of the right leg, and the outer portion of the tarsus and metatarsus thereof, together with others that covered the fingers and a part of the hands, and which hitherto had borne a sordid inflammatory appearance with some points very putrid, presented this day a clean and benign surface, with signs of cicatrization at their edges. It is also to be noted that some issues which the patient had kept running for a long time, and which gave out a sanious pus in very small quantity, discharged this day a very large quantity of good pus.

22d. Ninety-two grains in wine were given. His colour became much less red than it had been; many of the tubercles on the face and ears disappeared, and various portions of dried skin fell off; the ulcers appeared cicatrized over more than the half of their surface, and the issues continued to yield good pus abundantly. He had besides eight large stools; the urine and sweat continued to increase, as well as the sensibility of his skin and the mobility of all his limbs.

23d. He took no medicine, but the secretion of urine and perspiration continued, though less copiously than the pre-

ceding days.—The mobility and sensibility of the limbs was more evident.

24th. He took a dose of forty grains as before. This day was a very abundant spitting; the urine and sweat greater than the day before, and the ulcers almost healed. He had besides two large stools.

25th. The same prescription with the same results.

26th. The same dose and the same effects, except that the spitting was less. The ulcers were fomented with a decoction of the residue of the remedy, after sifting the powder.

27th. None of the Cuichunchulli given. The urine was excessively abundant, and he had to pass it twenty-five times, in consequence of which he felt an acute pain about the pubis, which however went off without any medical aid or medicine. The ulcers were reduced, that of the leg to the diameter of a half dollar, while those of the hands were completely cicatrized. The issues went on suppurating copiously; the powers of moving the limbs, and of sensation in them augmented.

28th. The remedy was likewise suspended this day; the urine and sweat beyond the natural quantity.

29th. Two scruples of the plant were given. There was more of urine and of sweat than the preceding day, and there was again much spitting of saliva. The colour of the face has been during the last days gradually, yet sensibly restored to its natural hue.

30th. The plant was not administered this day, because the portion of it that had been spared to this individual was now consumed. The good effects that had been observed for several days past began to diminish; the saliva was in its natural quantity.

The said Puche continued as above until the 2d of November, when all his "natural" functions appeared to be in the same state as before the exhibition of the Cuichunchulli, but the sensibility and mobility acquired during its use were retained, without tubercles in the face or ears. The ulcer of the leg had diminished to the size of a peseta, (about the size of a shilling;) the joints of the fingers having some motion in

such of them as had not lost any of the phalanges by the progress of ulceration: the feet and legs are quite œdematous, and particularly that which is ulcerated. It is found also that some down and hair has been reproduced in certain places whence it had fallen off, and chiefly on the head. The issues suppurate a good deal.

After that period, he was attacked with acute ophthalmia, and ulceration of one ear, but he was cured of these by the means usually prescribed in such affections; and at the present date he remains in the state above described.

#### DIARY OF THE EFFECTS OBSERVED IN CASANOVA.

The first dose of the Cuichunchulli, to the quantity of half a drachm, dissolved in water, was taken on the 10th of November. In the course of this day nothing unusual was felt, beyond some nausea after swallowing the medicine, and a sensible increase in the salivary secretion.

*11th November.* The same dose in the same vehicle; the secretion of saliva was much greater this day than yesterday, and it was of a yellow colour and fœtid. There were besides felt some spasms in the stomach.

*12th.* Forty-five grains were given; the secretion of saliva was moderate, and cramps were felt in the whole body.

*13th.* The dose of forty-five grains was repeated, and dissolved in wine and water; the quantity of saliva was much greater this day, accompanied by a distressing heartburn.

*14th.* The patient took a drachm of the plant in the same way, which caused some nausea; the flow of saliva was abundant, and that of urine so great that he passed urine seven times.

*15th.* The same dose as yesterday; the urine was passed six times this day, and the saliva greatly increased, with the colour and fœtor before mentioned.

*16th.* The dose was enlarged to a drachm and a half, diluted in two ounces of white wine; the urine was this day passed eight times, and there were three stools; the saliva continued as for some days past.

17th. The dose of yesterday was repeated; both urine and saliva were as before.

18th. Two drachms were given in wine; five large stools were produced, the urine was passed ten times, and the saliva as of late.

19th. The same dose as yesterday; and with the same results, except that the saliva was more foetid.

20th. The same dose; the urine and the saliva as yesterday; but only one stool.

21st. The same dose, with effects similar to those of yesterday.

22d. The dose was increased to two drachms and a half in wine; the urine and the saliva went on exactly as yesterday; but the stools were five in number.

23d. The Cuichunchulli was suspended this day; the urine and saliva continued in the same increased proportion as latterly.

24th. The patient took two drachms and a half of the plant in wine; he made water twelve times and had five stools; the saliva as abundant as of late.

25th. He took no medicine; the urine was passed eight times; the saliva as yesterday, and nothing else that was particular was observed.

26th. Two drachms and a half of the plant were taken; he made water thrice, and had four stools; the saliva increased as before.

27th. No medicine was taken this day, nor was any thing unusual noticed.

28th. The same dose of two drachms and a half was given; he urined three times and had three stools; the saliva as abundant as before.

29th. The medicine was suspended; the urine was passed eight times; the saliva as of late.

30th. He took two drachms and a half divided into two equal portions, with an interval of half an hour between them, and in the same vehicle; the first of them caused much vomit-

ing, but the second was retained; he urined this day eleven times and had three stools; the saliva was very abundant.

1st *December*. No medicine taken; nothing particular; urine and saliva less than yesterday.

2d. The same dose of two and a half drachms given in two portions. The urine was passed sixteen times; he had three stools. The saliva was in less quantity.

3d. He rested. The urine and saliva in an increased proportion.

4th. Two drachms and fifteen grains were administered, which was all that remained of the Cuichunchulli; the effects and other circumstances were the same as on the preceding days.

From this time, the copious secretions of the organs above mentioned diminished gradually in quantity, till the patient returned to the state in which he had been at his commencing with this medicine; no other improvement of his diseased condition having been felt, than that the redness of the skin over the face was lessened around the eyes only, and that he perceived a slight degree of feeling and of perspiration over the skin of his left foot, which he had not had previously.

(Signed)

M. DE AROCHE.

*Maracaybo*, 30th January, 1834.

From the preceding Diaries it will be seen that the remedy was discontinued in both the cases from the stock of it on hand having been all expended. It seems, however, that besides what Messrs. Casanova had spared to Puche, they generously forwarded a larger portion of it to Caracas for a young lady named Maria Antonia Macpherson, who was likewise affected with the Mal de San Lazaro, and who was there treated with it under the care of Dr. Don Carlos Arvelo. As her case has been published in an official report concerning the Cuichunchulli, which was presented to the Venezuelan Government by the College or "Facultad Medica" of Caracas, and printed in the Gazette of that city, of the 18th January, 1834, which is now before me, I think it right to cite this



also, as being immediately connected with the two foregoing cases, since the very same plant was unquestionably employed with each of the three patients, and as affording besides the experience of another disinterested practitioner in regard to its effects in that disease. The case is as follows:

“The Senorita Maria Antonia Macpherson, when eleven years old, and residing in the city of Maracaybo, was affected with a furfuraceous eruption over the lower extremities, which afterwards spread to other parts of the body. A medical practitioner having been consulted for this complaint, she was placed under treatment, which was continued with slight interruptions, for the space of four years. At the expiration of that time, as the disorder was advancing, and her parents were apprehensive that it might degenerate into some formidable affection, they determined to bring her to this city, (Caracas) where she arrived about the end of the year 1831. The young lady was then seen by several medical men, and by them it was with regret ascertained that she was already labouring under Elephantiasis, in a more than incipient state. Some recommendations, and above all, my desire to do all I could in behalf of this unfortunate young lady, and not any expectation of success in the attempts I might make, induced me to afford her my assistance, and to prescribe for her some of the most active and powerful medicines that are known. But all proved useless. The symptoms peculiar to Elephantiasis unfolding themselves, more and more established its character beyond all doubt. The colour of the face was of a darkish red, and the countenance dejected; the forehead was frowning, the eyes reddened, roundish, and having a harsh look, eyebrows destitute of hair, ears enlarged and elongated, the voice with a nasal sound, the breath fœtid, dark-coloured, grayish, and light brown patches on various portions of the skin, tubercles, and ulcers that had eroded the nails of the hands, loss of feeling in the skin, sudden faintnesses, general emaciation; such were the symptoms and condition which the patient presented in November last (1833,) a condition certainly well adapted for

testing the remedial power of whatever medicinal agent might be employed.

“It was in this state that she began to take the Cuichunchulli, which was given in the powder mixed with wine in doses of half a drachm, afterwards increased to two drachms; and she took in the whole ten drachms, which, though scanty, was all that could be obtained for a trial. The sensible effects were, a formication over various portions of the skin, but especially in the lower extremities, nausea more or less considerable and frequent, increased spitting like salivation, an open state of the pores, and even some perspiration, giddiness or vertigoes, a copious flow of turbid urine depositing a sediment, and whitish bilious evacuations. Of these several effects the ptyalism continued for many days after the medicine was expended. The result has been that the patient has experienced some marked alterations in her system, and a favourable change in the intensity of some of the symptoms. She has felt pains and tension in the hypogastrium, accompanied with a serous discharge tinged with blood, indicative as it were of menstruation, which had not yet appeared, although she is now 18 years old. She finds that her breasts, previously obliterated, are becoming painful and enlarging; her countenance is now cheerful, the colour of her skin lighter, the ears are reduced in size and no longer covered with scales; her voice is clear, the corroding ulcers on her fingers have healed, and her hands have acquired sufficient pliability and sensibility to enable her to use her needle. Two small tumours which she says that she had on the right shin, *probably* in the periosteum, have disappeared. In short, she performs all her functions with cheerfulness, ease, and promptness, particularly when moving about.”

Such are the cases related by Senor de Aroche and Dr. Arvelo; and although both their trials with the Cuichunchulli were cut short by insufficiency of the medicine supplied, they serve at least, if they may be relied upon, to attest its highly beneficial action in two of the three patients, Puche and Miss Macpherson. Yet, if these trials be compared with that of

the lay-jesuit, as related by Velasco, one would be led, from the very great difference in their respective course and results to conclude, either that the plant used in the last mentioned case was not the same with that forwarded by Col. Casanova to his relations in Maracaybo, or that the lay-jesuit's cure has been exaggerated. Of the identity of the plant in all the cases alluded to, nothing can now be determined; but we may at all events enter into some examination as to the fidelity of the Padre's statement.

It is clear, in the first place, that Velasco could have had but a slight knowledge of plants; else he would at once have perceived that the nerve-like filaments, which the Indian succeeded in making him believe to be the entire plant, were the roots only, and therefore "without any leaves." This was a deception doubtless resorted to for the purpose of preventing the Padre's discovering the plant itself; for it has been the constant practice of the Aborigines even to this day, as I am assured by Columbians of high authority, to enwrap in mystery and concealment every vegetable or other production of the country, which they believe to possess particular uses or virtues.

In the next place, will it be thought credible by any experienced physician that a single dose of only thirty grains of a vegetable powder, after vomiting and purging a Lazar violently, for a space of twenty-four hours, was able also, and immediately afterwards, to dry up and heal foul ulcers of years' standing, to remove every tubercular tumour on the surface of his body by causing the old skin to be cast off piecemeal, and to work the complete cure of so chronic a malady as that in question, in the course of "a few days?" In the third place, the Padre says that he was "an eye witness to all the occurrences just mentioned in Cuenca;" but it is plain that if the facts, as stated by him, be themselves very improbable, his assertion of having witnessed them will not be less questionable. When the firm persuasion, moreover, and the dread are considered, which have long been universally entertained throughout Spanish America of the extreme

contagiousness of the Mal de San Lazaro, it does not appear likely that Velasco would have unnecessarily exposed himself to the danger of taking it by personally visiting and watching the lay-brother in so advanced a stage of that loathsome disorder during the progress of his treatment. I do not here, however, mean to accuse Padre Velasco of intentional exaggeration of the case; but I conceive the probability to be that, as he knew the lay-brother to have been suffering severely from that disease, as he had seen the medicine that was administered to him, and as he found him afterwards improved in health, he gave ready faith to the story which the Indian chose to tell him, who would naturally desire to make the cure appear a marvellous one; and under that belief, while afterwards recording the event with the praiseworthy intention of ultimately making the virtues of that plant known to the world, he may have thought himself justified in saying that he had witnessed "all" the circumstances he mentions.

It may notwithstanding be remarked that, if so extraordinary a cure as the above had really been effected, it could scarcely have passed unnoticed in Cuenca, a city that contained at that period, besides a college of Jesuits (in which the patient probably resided), four convents of friars, two nunneries, and about twenty-five thousand inhabitants. The Jesuits were then, 1754, in the plenitude of their power; and one can see no motive for their suppressing on that occasion all mention of so powerful a remedy, as in that case it ought to have been considered, but a thousand for their at once divulging it, which, from their extensive connections, they had ample means of doing.

I revert, however, to my narrative. It happened in November, 1833, that a French gentleman settled in Maracaybo, Monsieur Jean Batiste Marcucci, who had been acquainted with Jacopo Puche's diseased state for some years, from having frequent occasion to pass his door, heard of his amendment, and was thereby prompted to visit him. Surprised at the great improvement he perceived in the Lazar's condition, and not knowing, as it appears, that Senor Casanova was then

under a similar treatment, he at once made up his mind to set out in search of the plant that had wrought so much good in him, in the hope, as well of procuring a relief for mankind against so horrid a disorder, as of deriving some personal advantage for the support of his large family. As no vessel then offered for Jamaica, he had, in January, 1834, to go coastwise to Sasarida in Coro, to Rio Hache, and to Aruba, in order to reach this island, whence he soon proceeded to Chagre and Panama. There, after a long detention, and in despair of a direct opportunity for Guayaquil, he was forced to embark in small coasting vessels, going occasionally in directions very different from his own, being almost always exposed to great privations, to personal hardships, and frequently to the various perils that attend this sort of navigation; and when at length he succeeded in reaching the coast of the State of the Equator, he found a great part of that country disturbed or desolated by a far-spread civil war, so that in every attempt he made to penetrate into the interior, he was sooner or later supposed by one or other of the hostile parties to be a spy, and generally compelled to retrace his steps, and encounter fresh difficulties or dangers at sea or on shore. In the end, unable to overcome obstacles that met him at every step in that distracted country, he resolved to make a wide circuit by the way of Peru, and finding an American whaler at Tumbes bound to Payta, he went on board; and, on his landing there, he proceeded to Piura, going for several days over heated sands; and thence, crossing the province of Loxa, he was able to enter the state of the Equator by roads almost impassable, over mountains of astonishing elevation and extremely cold temperatures, living for a month on the food of savages, and stopping in Indian huts, swarming with vermin, from which no precautions can preserve one. Thus harassed, and much bruised withal by the falling of his horse while descending a path unusually steep, on sliding ground, he arrived at Cuenca, where his first care was to inform himself as to the Cuichunchulli. Indians were presently brought to him, who assured him that they knew the plant perfectly well, and offered to get it for him,

and who soon returned with a plant that had a straight stem, twelve or fifteen inches high, bearing a few leaves and furnished with short, tender, thread-like radicles, and that grew in a rich and well watered soil. At the sight of this herb, so entirely different in appearance from that described by Velasco, as well as from that which Puche had shown him, he felt quite disconcerted. Nevertheless he dried the plant in the shade, and then had the roots and leaves reduced to powder that he might try it on himself. He accordingly took the same dose that Puche began with; but, as it produced no effect, he next took a dose of the powdered roots only, and this had no more effect than the former. Being now convinced that this herb was inert, not only by his own trials, but by those which he was informed that several persons had made in vain, in whom the Mal de San Lazaro had made great progress, and giving up all hope of obtaining the true plant through the agency of any of the Indians in that quarter, whose good faith he then suspected, he went to explore in person the mountains around Cuenca, and examined with great attention the most retired and least accessible spots of the deserts of Pasul, Izincocha, Mibir, and Soldados, where the wanderer is forced to stop and admire the strange and sublime effects of nature that he finds at every step; but, after eight days of fatiguing excursions, having met with no plant which bore the slightest resemblance to that he was seeking, he returned to Cuenca, taking a different direction from his former one, over a mountain of extraordinary height and abounding in grand and romantic scenery, but in deep affliction at the total failure of his enterprise. So much of enthusiastic zeal and perseverance, however, were not left wholly unrewarded; for in about a week after that fruitless expedition, he had the satisfaction of learning that the Post-Master-General of the district, who resided in Cuenca, had recently given a medicine called Cuichunchulli with great benefit to a son and daughter of his who had been suffering severely from leprosy for five or six years. Upon this he immediately waited upon that gentleman, and received from him the following detail of

the former state of his children, and of the results that had been effected in each of them by that remedy:

“I have two children, one a son 22 years of age, the other a daughter, 23. Both in their childhood enjoyed perfect health, but, before they reached the age of puberty, they were each most unfortunately seized with the lazarine malady. The disorder attacked the boy with more violence; for, in addition to dark coloured patches, enlargement of the ears, disfiguration of the features, eyebrows prominent and destitute of hair, nasal tone of the voice, and loss of the sense of touch, that were observed in them both, the lad had entirely lost the use of his legs, which were swelled to a monstrous degree, and covered with ulceration; and the fingers of his hands became contracted. In short, he was in so crippled a state that he could not stir a step by himself, and required the help of two servants to support him to walk about the house. The girl was not so grievously affected; but her menstruation was suppressed. When they had continued for a long time in this deplorable condition, and had taken a thousand drugs without any benefit, the account that had been published concerning the Cuichunchulli came to my knowledge, and I immediately administered to them the plant that grows here according to the directions therein given; the dose was afterwards tripled, but to no sort of purpose. Being then convinced that the plant of this neighbourhood was quite ineffective, I sent to request some of that of Canar, a town the climate of which is cold; but neither from this was any good effect obtained. During that period of trials that proved fruitless I received a letter from a friend to whom I had forwarded some of the Cuichunchulli of this place, in which he informed me that the plant I had sent to him did not possess the properties which had been attributed to it, and that he had reason to believe that the plant that was sent to Maracaybo must have come from the Province of Chimborazo. In consequence of this intimation, I wrote to another friend in Riobamba, begging him to send me some of the Cuichunchulli growing there. He sent it accordingly, and I at once gave it to my children, with



the happiest effect that could be desired. The action of the first dose, which was a drachm, (dos adarmes, i. e. two half drachms,) was extraordinary, operating copiously in both ways, and causing in each great perspiration and much languor. The girl vomited much more than the boy. They went on taking the remedy, in increased doses, and the result has been that both are remarkably better, but the boy particularly, who before could not feel a burning coal put close to his hand, but he now feels the bites of fleas; the swelling of his legs has gone down, the ulcers on them have healed, the fingers have become flexible, the dark patches on the skin and the enlargement of the features have disappeared, the pronunciation is clear, and he has so much recovered the use of his limbs that he saddles and mounts his horse by himself. In the girl, the marks of the disease have not yet wholly disappeared; she is, however, much improved, and menstruation has made its appearance, which gives me hope that her cure will be effected." With respect to these two cases, M. Marcucci adds "that not willing to rely altogether on the account he had received from Senor Borrero, he went to see his children, and was satisfied that they had both received very considerable advantage, although traces still remained in their countenances of the frightful malady with which they had been stricken."

Possessed of the above highly important information, Monsieur Marcucci made immediate preparation for proceeding to Riobamba, but the revolution that had already invaded the province of Chimborazo, and was advancing into that of Asuay, detained him in Cuenca a fortnight longer. The roads being at length free, he left that city, and passing over chains of mountains covered with eternal snow, wading at times through mire, crossing dark and dismal deserts, and climbing almost inaccessible heights, surmounted with others which one gets over only at the risk of breaking his neck, after eight days of unceasing exertions he reached Riobamba, a small town at the foot of the great Chimborazo. During this journey from Cuenca he had to stop at the small town of Canar, where he



made inquiries if they had the Cuichunchulli; and this being told to a white woman of the place, she supposed him to be a physician, and sent to request that he would see her, which he complied with. This unfortunate person, about 25 years of age, had all the signs of the Mal de San Lazaro, in a marked degree, and was besides in extreme indigence. She told him that it was four years since she was attacked with the disorder, and that, having lately heard of the virtues of the plant just mentioned, she had taken some of it that grew about that village; but that it had done her no good whatever; and that she afterwards procured the Chimborazo plant, though with the greatest difficulty, and had taken it in doses of two drachms, steeped in water for the space of ten days, at the end of which her supply of it was expended, and her poverty disabled her from obtaining any more, and even from getting proper nourishment. The medicine, she said, both vomited and purged her, and brought on excessive sweatings, a great flow of urine, and much faintness, but her ears and hands became less swelled, and more sensible, and the ulcers she had on different parts of the body were generally reduced to one-third of their previous size. She gave him a remnant of the plant from Chimborazo, with its leaves, &c., and these he found were exactly similar to those from Riobamba which had been shown to him by Senor Borrero in Cuenca.

When in Riobamba, Monsieur Marcucci received all necessary information concerning the plant he was seeking from the parties who had procured it for Senor Borrero, and by means of Indians whom they recommended, he collected some quantity of it, although, as it is not very abundant, he thought that quantity but trifling when compared with the expenses, the troubles, and the hazards he had incurred for its acquisition. He believes, indeed, that he might have collected more, if he had continued longer at Riobamba; but he was frequently indisposed during the thirty days he passed in that town, particularly from severe attacks of intermittent fever, and therefore was obliged to leave it for Guayaquil, where he embarked

first for Payta, then for Panama, and afterwards came here in his Majesty's brig *Savage*. Very shortly afterwards he did me the favour to place in my hands a portion of the *Cuichunchulli* he had brought with him, which he requested I would employ in cases of the *Mal de San Lazaro*, in order to ascertain its medicinal powers; and he likewise, at my desire, sent me an account of his voyage, from which I have extracted the foregoing particulars.

Mr. Marcucci being anxious that my trials of this plant should be made with the least delay possible, as his stay in Jamaica would be limited, I commenced by administering it to five of the most diseased Lazars, (negroes or samboes, one man and four women) that I found in the *Cocobay Asylum*, (a small building attached to the Kingston House of Correction,) whom I was kindly permitted by the officers of the institution to take under temporary charge; and I afterwards gave it to two others, a mulatto woman, and a white man. It is necessary to premise that the quantity of the dried plant which I received, when reduced to powder, did not exceed eleven or twelve ounces; that, to make it go farther, I had the stems and leaves ground up with the roots, (although I have since thought it very possible that the medicinal properties of the plant may reside in its roots alone,) and that, in consequence of Mr. Marcucci's being afterwards under the necessity of embarking for Maracaybo sooner than I had expected, (when he took with him the remainder of his *Cuichunchulli*,) my trials with it were necessarily put a stop to, long before they could fairly be deemed to have had sufficient time to produce their full results.

When the first six of the above mentioned patients had taken about ten drachms each of the powder, which was the whole that I could spare to them, and which was given in doses of thirty grains raised gradually to sixty, they generally stated that their condition was bettered in various respects, and particularly that the heat and tension they commonly felt over the body, mostly during the night, was considerably diminished, and was succeeded by a comparative

feeling of general ease and comfort; that their limbs were lighter and more flexible, and that the sense of touch, and the use of their hands and feet, were partially restored, so that some of them could handle a knife or a fork, work with a needle, or walk tolerably fast, which they were more or less unable to do before; most of them besides thought that their tubercular swellings were somewhat lessened, but such a reduction was to my eyes scarcely apparent. The natural secretions and excretions were sometimes moderately increased after taking the powder, but no one among them complained to me of very copious vomitings, purging, or secretions of urine or of saliva, neither did I witness the prompt curative effects which Messrs. Arvelo and Aroche observed in Miss Macpherson and in Puche. On the contrary the progress of the patients here has been comparatively slow, and their cure has, in truth, scarcely begun; but it has been to me no slight satisfaction to find that, in one of the most obstinate and loathsome of maladies, any sensible amendment, such as that acknowledged by the six patients now under consideration, could be brought about in the course of the five or six weeks only during which they were treated with the Cuichunchulli. It is right also to mention, first, that in all these cases I abstained from employing any of those other medicines, from which my previous experience in the treatment of that disease would have led me to expect useful aid; and secondly, that, as patients, the Lazars in the asylum laboured under serious disadvantages, because their food was only that allowed to the people confined for misconduct in the House of Correction; besides which most of them were very insufficiently clothed; but I made no objection to the patients on either of these scores, my object being to put the remedial powers of the Cuichunchulli to the clearest, though it might be the severest, test, which I was induced to do by the uncommon, and, I now believe, over-rated virtues ascribed to it by Padre Velasco. Had my trials been restricted to less advanced cases of the disorder, they would perhaps have been more successful. But, although no doubt exists in my mind that the Lazars in the

asylum received some benefit from that remedy, I must at the same time state my opinion that the account they gave of their own improvement ought not to be relied upon implicitly. I allowed them almost always to tell their own story, without putting leading questions to them, and I uniformly desired them to say nothing but the truth, and to inform me with equal readiness of the harm as of the good which they might think the medicine had done them; yet they seldom or never acknowledged any harm from it. It was doubtless a great consolation to these people to find themselves visited in their wretched and forlorn situation by a stranger, who was endeavouring to alleviate their bodily sufferings by administering to them what he hoped might prove a remedy; and this was likely to excite a desire on their part to afford him in their answers every satisfaction they could, so as to induce him to prolong his attendance on themselves, while a denial of any good effect from the medicine might, in their apprehensions, lead to the discontinuance of his visits, and to their being again as it were abandoned to their unhappy fate. But these observations do not apply to the mulatto female Lazar, since she was under no similar privations; and I regard her statements as sincere and worthy of credit. One of the effects she experienced it may be worth while to notice here. When she had taken about six drachms of the powder, I found that three small ulcers on her left hand had healed; and she said that she had more of feeling and motion, both in her hands and the joints than before; but she also said that, prior to my seeing her, she "used to feel great heat all over the skin, and mostly on the face and hands," which generally increased in the evening, and continued to such a degree through the night as to make her very restless, and to deprive her almost entirely of sleep, and that the only means by which she could abate that heat and get any rest was by bathing in cold water; but that now she had "much less heat over her, and was no longer obliged to bathe at night, but could lie down and get to sleep at once, and enjoy a sleep nearly natural." Soon after this, she was hindered for eight or ten days from taking the pow-

ders, and ere long the nightly heats recurred; but they again subsided after taking a few more powders.

The case of my white patient is next to be mentioned. As I had entire confidence in his punctuality as to taking the medicine, in his intelligence, veracity, and, I may add, moral worth, I felt great interest in his behalf, and therefore I gave him the remainder of the powder I had, about five ounces. He persevered in its use until he had taken the whole for about two months, during which he strictly conformed to whatever directions I judged requisite. But it is with pain I state that at the expiration of that term neither the patient nor myself could perceive that the Cuichunchulli had been of the least service to him. Sometimes indeed he told me that he thought himself rather better, but that farther reflection presently did away with the illusion. In this case therefore the plant in question has completely failed; but this failure may only serve to confirm the general rule, that no medicine is equally effective in all cases.

Having now submitted all the authenticated testimonies concerning the medicinal action of the Cuichunchulli that have come into my possession, together with my own experience of it, some notice of the plant itself seems requisite. Velasco, it will be recollected, spoke of it as "a small whitish slender nerve that issued from beneath stones to which it adhered firmly;" but from so obscure a description it would obviously be next to impossible to find out the plant. Besides this obstacle to its discovery, another serious one has arisen from the circumstance he stated, that the trial made with it by an Indian on the lay-jesuit took place in Cuenca. This naturally induces the belief that the plant he then used was a native of that city; and as there is an herb growing in that neighbourhood, which is known to the Indians by the name of Cuichunchulli, it is no wonder that various persons under that impression should, as we have already seen, have made trial of the Cuenca plant, although we are informed that, from its being wholly inert, they have all been miserably disappointed in its effects. For this reason, however, and also because the roots

of this plant, which have been above described, are very unlike those mentioned by Velasco, it is quite evident that it was not the Cuenca plant, but a different vegetable that was given by the Indian to the lay-jesuit, and Monsieur Marcucci is of opinion that the Indian's plant was in all probability procured, as we know that Senor Borrero's had been, from the skirts of the great Chimborazo, which are considerably less distant by going along the bye-paths known to the aborigines, than by the common road. Of the Cuenca plant, inert as it is, I am glad to say that, through the aid of my friend, Don Alejo de Ybarra y Sorzano, I have likewise received specimens taken from a quantity sent hither from Guayaquil (to be forwarded to a gentleman in Columbia, who had written for the Cuichunchulli,) under the supposition of its being the true or medicinal plant; and as these specimens had leaves, flowers, &c. it has been in my power to ascertain their botanical character, which I think it advisable to mention here, for the chance of its being copied into other publications, and of its thus becoming sufficiently known to prevent the recurrence of mistakes so distressing as happened in the instances of Senor Borrero's children, and of the other individuals to whom allusion has already been made. The Cuenca plant belongs to the Linnæan class and order of Didynamia gymnospermia, and to the natural order Labiatæ; but it does not correspond in its characters with any of the genera which I find described by authors under those heads, and it consequently seems to form a new genus, whose distinguishing characters may be thus defined, *viz.:*

Calyx campanulate, many-striate, five-toothed, teeth equal, mucronate; corolla, upper lip quadrified, lower rounded concave.

In addition to the Cuichunchulli of Cuenca, and to that brought from Riobamba by Monsieur Marcucci, which will be presently adverted to, I learn that a third plant bearing the same name has been mentioned as growing at Puracé, in the Canton of Popayan, and that this, having been examined by Professor Don Juan Maria Cespedes, proved to be the same

with a plant called *Featina*, that is found in the neighbourhood of Bogota and at Enemocan, and was formerly described by the celebrated botanist Don Francisco Mutis, under the name of *Viola Parviflora*, a title that has since been judiciously changed by another distinguished botanist, Monsieur Ventenat, into that of *Ionidium Parviflorum*. This latter plant is said to have been also used with advantage in the Mal de San Lazaro; but as the account of that trial appears not to have been written by a medical man, and has not even been authenticated by any signature, it cannot at present claim attention. I have, notwithstanding, been induced to compare the botanical characters of this plant with those of the Cuichunchulli of Riobamba, and as I find that, although of the same genus, they belong to different species, I shall subjoin their respective specific differences in order to prevent their being mistaken the one for the other.

The Cuichunchulli of Riobamba is a small humble plant, generally growing flat on the ground both in cold and in moderately warm temperatures on the sides of Chimborazo, and always in a dry and rocky soil, its roots so insinuating themselves between the stones that it is necessary to loosen these with a spade or other instrument in order to draw them out entire. It bears plenty of leaves, which seldom exceed five-eighths of an inch in length, and also of flowers one-eighth of an inch at most in height, delicate in structure, the petals of which are of a violet or purplish colour with the exception of the labellum, which is rose-coloured at the back, but white on the inner surface. The capsules are yellowish, one-tenth of an inch in diameter, and the seeds dark brown and shining. Cattle sometimes browse on the plant, but only for the purpose, as the Indians believe, of purging themselves, since it does not grow in sufficient quantity to serve them as a pasturage. The natives of the country use it among themselves as a very active medicine that vomits and purges at the same time.

Upon obtaining from Mr. Marcucci dried samples of the plant just mentioned, which I had reason to think was yet



botanically unknown, I examined it carefully, and found that it belonged to the Linnæan class and order, Pentandria Monogynia, to the natural order Violariæ, and tribe Violæ, of Decandolle, and to the genus *Ionidium* of Ventenat; but, after comparing its botanical characters with those of the several species of this genus that are described by the numerous modern authors, to whose works I have had access, and more particularly to the excellent *Prodromus systematis naturalis Regni Vegetabilis*, by Decandolle, I could not discover any species among them to which the plant from Riobamba could with propriety be referred, though it most nearly resembled *Ionidium parviflorum*. It appears therefore, to be a new species; and as it has been the practice with botanists to permit those, who make known the characters of genera or species that have not previously been described, to bestow on their plants such names as they may consider appropriate, I hope that the same favour may be extended to me in regard to the *Cuichunchulli*; and in this case I would propose that its specific designation should be *Ionidium Marcucci*, as a compliment due to Monsieur Marcucci, for the zeal and patience with which he encountered innumerable hardships and dangers in its search, and, when he had succeeded in obtaining it, for his philanthropic endeavours, through my means, to have its reputed medicinal properties ascertained, and to give the fullest publicity to its localities and peculiar characters, so that all hereafter, who might want it, should know where to procure it, and how with certainty to recognise it. The following are its botanical characters:

*Ionidium Marcucci* (nobis.)

Calyx quinque-partitus, basi in pedunculum decurrens, persistens; sepalis ovatis, acutis, glabris, margine membranaceis, duobus inferioribus reliqua paulo superantibus.

*Ionidium Marcucci*.

Calyx five-parted, running et base into the peduncle, persistent; the sepals ovate, acute, smooth, membranaceous at the margin, the two inferior (as they are termed by Ventenat and Decandolle,) longer than the rest.



Corolla pentapetala, bilabiata hypogyna, petalis thalamo insertis, inæqualibus, marcescentibus; labio inferiore monopetalo, calyce duplo triplove longiore, superne in laminam transversam vel labellum late obcordatum dilatato, medio angustato, carinato, basi paulo gibbo; labio superiore tetrapetalo, calycem superante, lateralibus antrorsum falcatis, mediis minoribus apice reflexis.

Stamina quinque, thalamo inserta, libera, approximata, filamentis, brevibus dilatatis, ovario adpressis, antheras ad basin gerentibus, apice ultra antheras in membranam ovatam stylum cingentem productis; antheris bilocularibus, introrsum rimâ longitudinali dehiscentibus; squamulis glandulisve nectareis nullis.

Ovarium superum, sessile, uniloculare, hexaspermum, placentis tribus parietalibus sepalis exterioribus oppositis, stylus I, persistens, apice recurvo; stigma obtusum, laterale, labellum spectans.

Capsula sphærico-trigona, trivalvis, unilocularis, sutura loculicida; valvis ab apice ad basin dehiscentibus, medio seminiferis, dispermis, sæpius abortu monospermis; seminibus globoso-ovatis, apice concavo-truncatis, nitidis, fuscis.

Pedunculi axillares, solitarii, uniflori, folio longiores, graciles hinc linea puberula notati, supra medium articulati, nec bracteolati.

Corolla five-petaled, two lipped, hypogynous; petals inserted on the thalamus, unequal, withering; the lower lip one-petaled, twice or thrice longer than the calyx, dilated at its upper portion into a transverse lamina or broadly obcordate labellum, narrowed and keeled at the middle, and slightly gibbous at base; upper lip four-petaled, higher than the calyx, lateral petals falcated forwards, middle ones shorter with their tips reflected.

Stamens five, inserted on the thalamus, free, approximating; filaments short, dilated, adpressed to the ovary, bearing the anthers near the base, produced beyond the anthers into an ovate membrane surrounding the style; anthers two-lobed, opening on the inside by a longitudinal cleft, and without any nectareal scales or glands.

Ovary superior, sessile, one-celled, six-seeded, with three parietal placentaë opposite to the outer sepals; style one, persistent, bent downwards at its tip; stigma obtuse; turned sideways towards the labellum.

Capsule sphærico-trigonal, three-valved, one-celled, with a loculicidous suture; valves opening from tip to base, bearing two seeds in the middle, but more frequently, from abortion, one seed; seeds globose-ovate, concavely truncated at apex, shining, dark brown.

Peduncles axillary, solitary, one-flowered, longer than the leaf, slender, with a line of pubescence on one side, joined above the middle, without bracteaë.

Radices lignosæ, teretes, subhorizontales, tortuosæ, ramosæ, ramis vermicularibus, sæpe fasciculatis.

Caulis suffruticosus, procumbens, teres, tubulosus, ramosus; ramulis bifariam pubescentibus.

Folia alterna, ovalia, basi cuneata, utrinque rugosa? sub-ciliata, serrata, dentibus apice glandulosis; petiolis brevibus; stipulis petiolo sublongioribus, ovato-lanceolatis.

Roots woody, round, subhorizontal, tortuous, branched; branches vermicular, often in tufts.

Stem undershrubby, procumbent, round, tubular, branches branched pubescent on two opposite sides.

Leaves alternate, oval, wedge-shaped at base, wrinkled on both sides? subciliated, serrated, apex of the teeth glandular; petioles short; stipules rather longer than the petioles, ovate-lanceolate.

#### *Character Specificus.*

*Ionidium Marcucci*, (nobis) suffruticosum, procumbens, ramosum, ramis bifariam pubescentibus, foliis alternis, ovalibus, basi cuneatis, serratis, dentibus apice glandulosis, stipulis petiolo sublongioribus, ovato-lanceolatis, sepalis ovato-acutis, labello calycem duplo triplove superante, late obcordato, petalis lateralibus falcatis, filamentorum membranis terminalibus ovatis, pedunculis hinc linea puberula notatis, folio longioribus, capsula sphaerico-trigona, seminibus globoso-ovatis, apice concavo truncatis nitidis fuscis. Habitat inter saxs prope Riobamba et Hambato Quitensium, ad pedem Volcani Chimborazo.

*Differt Ionidium Marcucci (nobis) ab Ionidio parviflora (ventenat) Viola parviflora (Mutis et Linnæi.)*

Caule suffruticoso, procumbente, tubuloso, foliis ovalibus, foliorum dentibus apice glandulosis, stipulis

#### *Specific Character.*

*Ionidium Marcucci*, undershrubby, procumbent, branchy, branches pubescent on two opposite sides, leaves alternate, oval, wedge-shaped at base, serrated, the teeth glandular at the apex, stipules longer than the petioles, ovate-lanceolate, sepals ovate-acute, labellum twice or thrice longer than the calyx, obcordate, lateral petals falcated, terminal membranes of the filaments ovate, peduncles with a line of pubescence on one side, longer than the leaves. Capsules sphaerico-trigonal, seeds globose, ovate, concavely truncated at the apex, shining, dark brown. Growing among the rocks about Riobamba and Hambato, at the foot of the great Volcano Chimborazo.

*Differt Ionidium parviflorum (ventenat) Viola parviflora (Mutis et Linnæi) ab Ionidio Marcucci (nobis.)*

Caule fruticoso, diffuso, foliis ovatis, stipulis petioli vix longitudine, pedunculis glabris, labello ovato,

petiolo sublongioribus, pedunculis bilobo, squamulis nectareis subclavate obcordato, squamulis nectareis nullis.

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*Specific differences of Ionidium Marcucci, as compared with Ionidium Parviflorum.*

Stem undershrubby, procumbent, tubulous, leaves ovate, with the apex of their teeth glandular, stipules rather longer than the petioles, peduncles pubescent on one side, labellum broadly obcordate, no nectareous scales.

*Specific differences of Ionidium Parviflorum, as compared with Ionidium Marcucci.*

Stem shrubby, diffuse, leaves ovate, stipules rather shorter than the petioles, peduncles smooth, labellum ovate, two-lobed, nectareous scales subclavate.

*Jamaica Phys. Journ.*

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## ART. XXII.—ON THE PURIFICATION OF BEET JUICE, AND A METHOD OF PREPARING IT IN THE BEST MANNER. By M. PELLETAN.

HAVING for the last two years paid much attention to the subject of beet sugar, and the best methods of making it, I have become acquainted with the most scientific manufacturers, and have visited many of their establishments, and more especially that at Boistrancourt, under the direction of M. J. Castelyen.

I soon perceived, in a practical study of this new branch of industry, that the great difficulties were in the clarification of the juice and in the boiling. The first of these is accomplished by the addition of slacked lime, which is mixed with the juice just before it comes to the boiling point, and continuing the heat till ebullition commences. By this a scum is produced, which rises to the surface, whilst at the same time a precipitate is formed, leaving the intermediate fluid more or less clear and coloured. It is judged that the clarification is successful, 1st, when the scum is consistent; 2d, when the precipitate

takes place immediately, leaving the liquid clear; 3d, when this liquid is but slightly coloured.

Unfortunately, however, the dose of lime required is very variable, according to the season, the nature of the soil in which the roots have grown, the mode in which these roots have been kept, and finally, according to the time which has elapsed since they were gathered; it therefore varies from half a pound to three pounds to the hectolitre (22 gallons) of juice.

The sedulous attention of the manufacturer may obviate this inconvenience, in part, but even the greatest care is sometimes ineffectual, because, first, the clarification may take place where a sufficient quantity of lime has not been used; second, from the same result occurring with an excess of this agent; in either case much embarrassment in the subsequent processes will ensue.

If the lime has not been used in sufficient quantity, the juice, although but little coloured at first, will become very dark when evaporated, and the syrup will acquire great viscosity; if, on the contrary, an excess of lime has been employed, the juice will be light coloured and the syrup of a bright yellow, but on concentration, they will become burnt if the operation be performed by a naked fire, and will be deteriorated if evaporated by steam.

The causes of these two accidents have already been explained by several manufacturers and chemists; it has been shown that beet juice contains a mucilaginous matter, which is acted on very rapidly by the air; this is capable of combining with the lime and forming a precipitate; if a certain proportion of this remains in the juice, the syrup will be dark coloured as well as viscid. On the other hand, if an excess of lime be used, this excess will combine with the sugar and form a saccharate of lime; a compound which is very soluble, uncrystallizable, and retaining so much water as almost to prevent any concentration of the syrup.

Manufacturers have hitherto resorted to but one expedient to obviate these drawbacks; this consists in the use of animal charcoal. This substance, in fact, possesses not only the

property of decolourizing the syrup, but also of absorbing and retaining both the mucilage and the excess of lime. It would therefore appear, that it is merely necessary to filter the juice and syrups through a sufficient quantity of animal charcoal, to obtain the desired result.

But animal charcoal is dear, and will become more so as the demand for it increases; added to which, the quantity required is very great. I have seen pound for pound of it used, and even this prove insufficient, entailing an expense of 60,000 francs (\$12,000) in the manufacture of 500,000 pounds of sugar, and perhaps it should have been doubled to have ensured the best results.

Manufacturers have therefore endeavoured to discover other means of removing the excess of lime, and it has been shown that this can be effected by means of an acid. Hence, in several establishments, alum and diluted sulphuric acid have been used; the solution of alum or the dilute acid being added to the syrup the moment it displays an excess of lime.

These methods, however, are attended with serious inconveniences; the sugar produced where an acid has been used being of a reddish colour, and having a burnt smell.

Other chemists have proposed to saturate the excess of lime with carbonic acid, but at the same time admit the difficulty of doing so. I had myself thought of this plan, and made arrangements for executing it in my apparatus for boiling the syrup in vacuo, but on a mature consideration of the difficulties attendant on it, abandoned it as useless.

I have found that to prevent the beet syrup from becoming red on concentration, there must be an excess of alkali, and also on the contrary that if this excess be too great, that the syrup will be ropy, and give a yellow and small grained sugar.

The hot air apparatus of M. Brame accidentally produces the complete saturation of the alkali contained in the clarified juice; in fact, the small proportion of carbonic acid forming a constituent of the vast body of air which in this apparatus passes through the juice, is sufficient to precipitate the whole of the lime, and on this account, the sugar produced is of a

reddish colour and has a burnt smell, and hence commands an inferior price.

It appeared to me that the presence of a certain quantity of alkali in the syrup preserves the sugar from acquiring a burnt smell, and this is confirmed by several facts. It should also be borne in mind that sugar which becomes dark coloured from the absence of an alkali, is with great difficulty whitened by means of animal charcoal.

Since, therefore, it is shown that the syrup must possess a certain degree of alkalinity to afford a good product, it remains to point out a simple but effectual mode, by which manufacturers may also keep their syrups in this state. This may be done as follows. Being provided with—

1. An alkalimeter, consisting of a tube graduated from 0° to 100°;
2. Alkalimetric liquor reduced to  $\frac{1}{10}$ , made by mixing one part of concentrated sulphuric acid of commerce with one hundred parts of water;
3. A graduated vessel to estimate the syrup;
4. A large vessel, in which the experiments are to be made;
5. Litmus paper, slightly reddened by an acid;

The trial is to be made in the following manner: When the syrup marks 10° of the syrupmeter (*pese sirop*), a certain quantity is measured by means of the graduated measure; this is to be poured into the large vessel. On the other hand the alkalimeter is to be filled with the alkalimetric or test liquid, to 0° of the scale. This is then to be gradually added to the syrup, stirring well after each addition, and the test paper constantly used; as soon as this is restored to its blue colour, the addition of the diluted acid is to cease. The quantity of the test liquid required to produce this, is to be carefully noted, and the syrup then heated to observe whether the desired result is obtained; in general it will be found that the syrup requires 50° of the alkalimeter to bring it to a proper degree of alkalinity.

This operation, although apparently troublesome, is readily performed with a little experience, in a few minutes. When a manufacturer has ascertained the alkalimetric degree at which

his syrup evaporates the best, he should prepare the dilute sulphuric acid; this is done by mixing one part of the acid of commerce with twenty parts of water. He may now employ as much lime in clarification as he deems expedient. After evaporating the syrup until it marks  $10^{\circ}$ , a trial is to be made of it. If it marks more on the alkalimeter, than that ascertained to be the most advantageous, the dilute sulphuric acid is to be added by degrees, so as to reduce the syrup to the proper point.

With a little experience the manufacturer will readily ascertain the quantity of acid sufficient to saturate a given weight of lime; thus he will find that about a quart of the dilute acid will correspond to about a quarter of a pound of lime; so that when he is obliged to use an excess of this latter, he will at once be aware what additional quantity of acid will be required to saturate it.

An acquaintance with this fact, however, does not preclude the necessity of a preliminary trial of the alkalinity of the syrup, as this is liable to many changes; hence we have not been able to give any precise scale of degrees applicable to this syrup, nor attempted to decide in a positive manner with regard to the quantity of acid to be employed to a given weight of lime, as these must depend on the nature of the roots, the season of the year, the time the roots have been kept, &c., as well as on the purity of the lime.

But although we cannot give these data, we are happy in pointing out to the manufacturer a ready method of ascertaining the best proportions of alkali and acid required, and thus enabling him to obtain certain and invariable results.

I will cite an example in point. After having ascertained the truth of the above mentioned facts by a series of careful experiments, I had occasion to visit a well known manufactory; on entering it, I was immediately convinced, from the smell, that the syrup then boiling was not sufficiently alkaline, and was told that the sugar obtained was red and could not be bleached. On examining the process, I found that a pound of lime was used to each hectolitre of juice, that the clarification was apparently perfect, but that the syrup on eva-

poration became as red as blood. I advised that the proportion of lime should be increased; this was gradually done till it amounted to three pounds to the hectolitre of juice; the syrup and sugar now assumed a light yellow colour, but it was requisite to employ the acid to prevent their becoming ropy.

I am aware that there exists a general dislike to the sugars hitherto prepared with acid, and which may be always recognised by their colour and smell, and will make a few remarks on the subject.

It has almost always happened, that the manufacturers who endeavoured to obviate the excess of lime by the addition of sulphuric acid, have produced a red product; this has arisen from the following causes: first, the acid is oftentimes added at random, and though the most careful workmen employ it cautiously, and resort to the test paper to avoid an excess, thinking that this is the great evil to be guarded against, they are equally in error; for it is only when the sugar is too acid that it becomes red—this happens also when it is not sufficiently alkaline; so that the test paper is not a sure guide for estimating the proper quantity of acid to be used, there being in fact in most cases too much when the paper is restored to its blue colour, and consequently the liquor still alkaline; hence the syrup is not red from being too acid, but not sufficiently alkaline; in fact, the alkalimeter affords the only sure criterion of the proportion of acid to be employed.

There is another question which I have not been as yet able to solve; this is to ascertain if all the alkali in excess in the syrup is lime. As beet juice contains potash and ammonia, and as these alkalies may remain in a free state in the liquid after clarification, and even after the addition of a certain portion of sulphuric acid, which combines with the lime in preference, it may be that the excess of alkalinity is in part owing to these alkalies.\* *Journ. de Con. Usuelles.*

\* We have inserted the foregoing memoir, although it does not strictly comport with the plan of our Journal, but as the public attention is at this moment directed to the subject of Beet sugar, we have thought that these practical details would prove interesting to many of our readers. Ed.



## ART. XXIII.—ON THE EVOLUTION OF LIGHT DURING CRYSTALLIZATION. BY HENRY ROSE.\*

AN emission of light has often been noticed during crystallization, but its appearance has always been a casual one, and never, as far as I am aware of, has it been produced at will. I have observed, during the crystallization of arsenious acid, a strong emission of light, which differs from that seen during the crystallization of other substances, inasmuch as it may be produced at pleasure. Take two or three drachms of the transparent or vitreous arsenious acid, put it in a mattress of white glass along with an ounce and a half of not fuming muriatic acid of the common strength, and half an ounce of water; allow the whole to boil for ten minutes or a quarter of an hour, and then let it cool as slowly as possible, which is best done by gradually decreasing the flame of the spirit lamp which had been used for the boiling. If the experiment is conducted in a dark room, the crystallization is accompanied by a strong emission of light, the formation of each little crystal being attended by a spark. If the vessel is then agitated, a great number of crystals suddenly shoot up, and an equal number of sparks occur at the same time. If a considerable quantity of arsenious acid, such as an ounce or an ounce and a half, or more, is treated with a corresponding quantity of diluted muriatic acid, then, on shaking the vessel, if the right moment be seized, the emission of light from the shooting of the crystals is so powerful that a dark room may be lighted up by it.

Considerable time elapses before the acid solution of arsenious acid leaves off depositing crystals, consequently the cooled solution still continues to emit light on the second and even on the third evening, but only extremely feeble, and only when it is agitated. It is, however, impossible after this to produce any emission of light; a proof that it is occasioned by

\* Read to the Academy of Sciences at Berlin, July 30, 1835.

the shooting of the crystals, and not by electricity of friction. If the hot solution of the transparent arsenious acid is allowed to cool rapidly, whereby a friable mass of arsenious acid is obtained; then either a very feeble light or none at all can be observed. Equally little light is observable if the transparent acid is treated with acetic or nitric acid, the latter either of the common strength or fuming. The reason of this is simply that these acids dissolve but very little of the arsenious acid, especially the acetic acid, so that this solution is but slightly tinged yellow by sulphuretted hydrogen, without any sulphuret of arsenic being precipitated. Dilute sulphuric acid, on the other hand, dissolves rather more arsenious acid by boiling, and if this solution be allowed to cool very slowly, a feeble light may sometimes be observed. If a large quantity of the transparent arsenious acid is treated with only so much nitro-muriatic acid (which, however, must contain an excess of muriatic acid) that it is not completely dissolved and oxidized to arsenic acid, a strong light is then observed on cooling.

The cause of the luminosity of crystals during their formation has long appeared to me to be this: that the substance which separates from a fluid in the form of a luminous crystal is not contained as such in the solution, but that it is only formed when the crystal is formed, and that the appearance of light is necessarily conditioned by the formation of a new substance in a crystalline state.

The light evolved during the crystallization of substances has most frequently been observed with sulphate of potash, but always only casually, and never during the recrystallization of pure sulphate of potash; but, as I believe, merely during the crystallization of the solution of the residue from the preparation of nitric acid. This contains almost always sesquisulphate of potash, which as such is soluble in water, but which, according to Phillips, is decomposed whilst crystallizing into bisulphate and neutral sulphate of potash; and the latter becomes luminous during crystallization, whilst it is formed in the fluid, and crystallizing out of it.

Two isomeric states of the arsenious acid are commonly

known: it is either transparent and vitreous, or porcellaneous and opaque. At first, after melting, it is quite transparent, but simply by keeping it, and without its experiencing any increase of weight, it becomes milk-white and opaque. In both states the acid has different specific gravity and solubility in water.

I have only been able to observe the evolution of strong light during the crystallization of the arsenious acid, when I treated the vitreous acid with muriatic acid in the above mentioned manner. In the same manner the opaque acid and also the pulverulent arsenious acid, which is obtained by sublimation during the roasting of the arsenical ore, and which is known in commerce under the name of "Giftmehl,"\* when treated with muriatic acid did not produce, even by the most gradual cooling, any light, and it was only by shaking the vessel that a very feeble light was visible; in the latter case most likely because the opaque acid contained still some portions of the vitreous acid. But this feeble light could never be compared with the strong light which was visible when the transparent acid was employed. The light evolved during the shooting of the crystals of the arsenious acid appears, therefore, to depend upon this,—that the solution of the transparent acid is changed by crystallizing into the opaque or porcellaneous kind. The crystals produced belong, therefore, to the opaque modification; and the change of the transparent into the opaque acid is caused by nothing else than the transformation of the acid from a completely uncrystalline to a crystalline state.

The crystals of arsenious acid which are obtained from a very slowly cooled solution in muriatic acid are, however, transparent; but this transparency is caused only by their size, and an aggregate of very small crystals of the acid would exhibit an opaque appearance. The crystals formed were always regular octohedrons, and did not possess the form ob-

\* The suboxide of arsenic of Berzelius.

served by Wohler, which is, perhaps, a third isomeric modification of arsenious acid.

If the transparent acid is treated in the above mentioned manner and proportions, and the crystals have been formed accompanied by phosphorescence, and the whole been allowed to cool perfectly, the phosphorescence can be obtained once more, and sometimes even very powerfully, if the whole is again heated to the boiling point and slowly cooled. However, the light is much more feeble than that first observed, and is only caused by the muriatic solution still containing portions of the transparent arsenious acid, and which, during crystallization, evolves this feeble light. Moreover, the quantity of dilute muriatic acid in the mixture above described is not sufficient to dissolve all the arsenious acid; and there remains, therefore, a small portion in the vitreous state.

But still the appearances of light which have been observed cannot be explained on the principle of a new arrangement or formation, and I myself hold this hypothesis to be one which requires the evidence of more facts to establish its probability. Thus, Berzelius observed phosphorescence during the crystallization of fluoride of sodium out of a solution which held the same salt already in solution.

*Arcana of Science.*

ART. XXIV.—PREPARATION OF HYDROCYANIC ACID OF UNIFORM STRENGTH. By THOMAS EVERITT, Esq., Professor of Chemistry to the Medico-Botanical Society.

THE best proportions of the ferrocyanuret of potassium and sulphuric acid to be used when we want hydrocyanic acid, are as follow:—

To every 212.47 grains of the crystals dissolved in about two fluid ounces of water, add so much dilute sulphuric acid as shall contain 120 grains of real acid, and, by conducting the distillation carefully, 41 grains of hydrocyanic acid pass off; and that I find with the first third of the water; of course water must be put into the receiver and kept very cold. But no process for procuring a dilute solution of hydrocyanic acid, in which distillation or filtration is had recourse to, will yield an acid of uniform strength, however carefully the process may be conducted, not even, as I have proved, if the receiver be surrounded with ice. Hence the *absolute necessity* of assaying in all such processes the ultimate product, either by the nitrate of silver or the peroxide of mercury method; the first is to be preferred: we have the great advantage that any error committed in collecting, drying, and weighing, is reduced to one-fifth in estimating the quantity of real acid, 100 grains of the cyanide of silver corresponding to 20.38 of hydrocyanic acid.

In addition to the very elegant application of the nitrate of silver for detecting the presence of free hydrocyanic acid in its passage as vapour from a dilute solution, or any plant containing the acid (thus, masticate a bitter almond, put in a watch glass, and cover it with a bit of glass, on the under surface of which a drop of dilute nitrate of silver is placed; in a few minutes the cyanide of silver is formed—an experiment which may serve as a class illustration of the extreme volatility of the substance), recommended by Mr. Barry in the London and Edinburgh Philosophical Magazine, vol. iv., p. 151, (or

*Repertory*, New Series, vol. i., p. 178—181, in the number for March, 1834). Mr. Barry has also put me in possession of a means as elegant for the testing of the presence of minute quantities of hydrochloric or sulphuric acid in hydrocyanic acid, viz.: put some of the acid on a watch glass, add two or three drops of *liquor ammoniæ*, put the glass on the sand bath and evaporate to perfect dryness, when all ammonia and hydrocyanic acid pass off, leaving only, if any hydrochloric or sulphuric acid be present, a little hydrochlorate or sulphate of ammonia behind; a drop or two of distilled water will dissolve these, and by nitrate of silver added to one half, and nitrate of barytes to the other, the presence or absence of the above acids will be determined. If the hydrocyanic acid be quite pure, the watch glass, after evaporation, is scarcely soiled, and water dissolves nothing: this method is far preferable to that by means of carbonate of lime usually recommended.

In a paper which I read to the Medico-Botanical Society, on Thursday, December 9, 1834, on the methods of assaying medicinal hydrocyanic acid, I stated that I had examined samples of the acid procured from various shops in town, and that the frightful difference of strength had induced me to make the results known, with a view of calling the attention of the medical profession to the evil. Thus, samples from Allen, Hanbury & Co., yielded 5.8 per cent.; from Apothecaries' Hall, at different times, from 2.1 to 2.6 per cent.; and from several sources I found acid containing only 1.4 per cent. These samples I procured from the several shops personally, and asked for Scheele's strength. They were assayed within 24 hours after they were in my possession, both by the nitrate of silver, and the oxide of mercury method, and the results in no cases varied more than 1.10th of a grain from each other. Now it is true we have no fixed standard, and therefore it is impossible to say whether Allen & Co.'s is too strong or the others too weak; but thus much is certain, that if a medical man were pushing the exhibition of hydrocyanic acid gradually to a maximum dose, the prescriptions being carried to a shop where the acid had only 1.4 per cent., and

then, by some accident or other cause, taken to where Allen's acid was used, a sudden, and I fear, a fatal increase would be the result, for more than a triple quantity would be taken. For the possibility of a fatal accident I need only refer to the case of seven individuals near Paris being killed by a slightly increased dose, recorded in all the medical periodicals a few years since.

On the same evening I called the attention of the members of the Medico-Botanical Society to the method for procuring medical hydrocyanic acid recommended by Dr. Thomas Clarke, by cyanide of potassium and tartaric acid; a method which can now be employed by any one, since Mr. Laming has brought into the market a very pure salt. From very numerous trials, I find that the procuring of this salt, the cyanide of potassium perfectly pure, must be expensive, and I have never been able to procure it strictly in this state without using alcohol to crystallize it from; and many chemists, I find (see Mr. Barry's paper above alluded to) object to it, from its being so excessively deliquescent, and hence rather unmanageable, and also to the liability of this highly poisonous salt being mistaken for other white salts on their counters. This latter objection, I must say, is hypocritical: if people will be careless there is no means of preventing mistakes, and I conceive the objection of Mr. Barry applies with tenfold force to many arrangements of a druggist's shop, where we often see tincture of opium flanked right and left by other dark tinctures; and who that has manipulated has not caught himself laying hold of, and using one acid, &c. for another, when the mind is also at work?

I have made many trials as to the practicability of applying the cyanide of silver and dilute hydrochloric acid for procuring medical hydrocyanic acid. The cyanide of silver presents many advantages: it is perfectly stable, being neither affected by light nor moisture; its purity can be very easily ascertained, and every five grains of it will yield one grain of acid. It can be procured by conducting the vapour from the process described above into a pint of water, holding 255

grains of nitrate of silver, washing and drying at  $212^{\circ}$ . It yields 201.6 grains of white cyanide. I should recommend that the bottle containing this salt be accompanied by a small stoppered phial with dilute hydrochloric acid of such strength that one minim will exactly decompose one grain of the cyanide: thus, suppose one corked phial having 200 grains of cyanide, with an half ounce stoppered bottle with hydrochloric acid of specific gravity 1.129, this would be enough to make five fluid ounces of dilute hydrocyanic acid of the Dublin strength, if the following formula be followed:—Into a phial capable of holding rather more than one fluid ounce, put 40 grains of the cyanide, add 7 fluid ounces, 20 minims of water, and 40 minims of the dilute hydrochloric acid; cork closely, shake several times for the first quarter of an hour, set aside to allow the chloride of silver to fall, decant the clear liquid into another bottle to be preserved for use: every fluid drachm will contain one grain of real hydrocyanic acid.

The only objection I had *a priori* to this process was the liability of a little free hydrochloric acid remaining in the solution, since all books echo that the presence of a minute quantity of the mineral acids very much hastens the decomposition of this acid: a statement perfectly opposite to fact, at least as far as concerns hydrochloric acid. I prepared 4 ounces of hydrocyanic acid perfectly pure by distillation of chalk; to 2 ounces I added 5 drops of hydrochloric acid; the other 2 ounces in another phial were left perfectly pure, both inverted and placed in a glass case so as to have diffused light during the day. After three weeks the pure acid had become quite brown, and a considerable quantity of solid deposit had formed; the other remained quite limpid and colourless, and, on actual trial, was found to contain 19.20ths of the acid which it had at first. Mr. Barry also informed me that his fourteen years' experience led to the same result; and that being aware of this, he adds purposely a little hydrochloric acid to all his medicinal acid. Perhaps some may object to the price of the preparation: a case containing the two bottles with 200 grains of the cyanide would leave one-



half profit if sold for five shillings; this brings an ounce of acid to one shilling, and where so small a quantity is used, surely this cannot be a very weighty objection, if a uniform article can be secured.

*Arcana of Science.*

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MINUTES OF THE COLLEGE OF PHARMACY.

*January 26, 1836.*—The committee on Patent Medicine Directions, made a report which was accepted, and the committee continued.

Letters of resignation from M. Pleis, John Elliot and Thomas M'Clintock, were read and accepted.

A communication from W. & L. Krumbhaar in relation to an article by W. L. Rushton, published in No. I., Vol. VII., Journal of Pharmacy, on an adulteration of acetate of morphia, requesting the College to appoint a committee of investigation, with instructions to report at the next stated meeting. The whole subject was referred to the Committee on Equity, with instructions to report in writing to the College.

The resignation of Stephen Proctor, through Dillwyn Parrish, was duly accepted.

*February 23.*—The Committee on Equity, to whom was referred a communication from W. & L. Krumbhaar, reported progress, and were continued.

The propriety of publishing a list of the members of the College being under consideration, it was resolved that the subject be referred to a special committee, with instructions to report their views, together with a correct list of all members of the institution.

*March 29.*—The Board of Trustees reported the election of Jos. Trimble and Richard Price as resident members, and also that Joseph M. Turner, John Simes and Henry C. Blair hav-

ing complied with the requisitions of the School of Pharmacy, passed a creditable examination before the Professors and Committee appointed by the Board, have been duly declared graduates in the Philadelphia College of Pharmacy. The Committee to whom was referred the subject of preparing and publishing a correct list of the members of the College, made a report, which was accepted, and the following resolutions proposed by them, adopted:

That 250 copies of the List of Members be printed in a handsome type on good paper, and that each Resident, and as far as practicable, each Associate and Honorary Member be supplied with one, at the expense of the College.

That the revised list be also published as an addenda, and bound with the next number of the American Journal of Pharmacy, and also that the same be published three times in three of the daily papers.

That the Board of Trustees be directed to revise the list of members once in every two years, and have it published as above ordered.

The Committee on Equity, to whom was referred the communication of W. & L. Krumbhaar, in relation to adulterated acetate of morphia, made a report which was read, and referred back to the committee, with instructions to correspond with N. Cance, of New York, on the subject, and to report at the next meeting.

The Publication Committee made their annual report, showing a balance in their favour of \$355 00, besides the stock of Journals on hand, which was accepted.

The College then went into the annual election for officers, when the tellers reported the following as duly chosen:

*President*—D. B. SMITH.

*Vice Presidents*—HENRY TROTH, G. B. WOOD, M. D.

*Recording Secretary*—CHARLES ELLIS.

*Corresponding Secretary*—ELIAS DURAND.

*Treasurer*—EDWARD B. GARRIGUES.

*Trustees*—WARDER MORRIS, EDWARD ROBERTS, RICHARD M. REEVE, THOMAS H. POWERS, R. E. GRIFFITH, M. D., JOHN C. ALLEN, DILLWYN PARRISH, JOHN BRINGHURST.

*Publishing Committee*—D. B. SMITH, G. B. WOOD, M. D., F. BACHE, M. D., CHARLES ELLIS, JOSEPH SCATTERGOOD, JOHN C. ALLEN, WILLIAM HODGSON, jr., ELIAS DURAND, DILLWYN PARRISH and R. E. GRIFFITH, M. D.

*June 28.*—A communication from Drs. Wood and Bache was read presenting the third edition of their Dispensatory, for the Library of the College. It was resolved that the same be accepted, with the thanks of the College.

Letters of resignation from Henry M. Zollickoffer and Thomas C. Percival were read and accepted.

A valuable collection of Botanical Specimens of dried plants, arranged with much care, and in a perfect state of preservation, with catalogues, was presented by R. Peter, M. D., Professor in the Medical College, Lexington, Ky. It was, on motion, Resolved, that the thanks of this College be presented to Professor Peter for this valuable addition to their Cabinet of Specimens, and that the Secretary be directed to communicate to him, on behalf of the College, a copy of this resolution.

A report from the committee appointed last year, on Latin Labels, was read. These labels are arranged according to the nomenclature of the United States Pharmacopœia and other standard authorities, and are published in books neatly executed on coloured paper, for the use of Druggists and Physicians. The committee have found it necessary to publish a second edition, and have secured the copyright to the College. They conclude their report with the following:

Inasmuch as it is to the labours of our fellow members Tyson & Fisher, of Baltimore, that we chiefly owe this book of Latin Labels, therefore the committee have the pleasure of offering the following resolution:

Resolved, that the thanks of the College, with 12 copies of these Labels, be presented to Tyson & Fisher.

The following report from the Committee of Equity was read and adopted:

*To the Philadelphia College of Pharmacy.*

The Committee of Equity to whom was referred the communication from W. & L. Krumbhaar, requesting an investigation how far they were accessory to the manufacture and sale of a certain article sold by them to Rushton & Aspinwall, of New York, as Acetate of Morphine, knowing it to be impure, respectfully Report,

That, they have given diligent attention to the subject referred to them, and after the examination of several disinterested persons and others, are unanimously of the opinion that the article said to be Acetate of Morphine, and sold by W. & L. Krumbhaar to Rushton & Aspinwall, of New York, was not a genuine article, but that W. & L. Krumbhaar did not know at the time they sold it that it was not good and genuine.

Respectfully submitted.

EDWARD B. GARRIGUES,

PETER LEHMAN,

JACOB BIGONET.

*Fourth Mo. (April,) 25, 1836.*

A communication from Tyson & Fisher to the Publishing Committee of the American Journal of Pharmacy, presenting their annual statement of the concerns of the Journal under their charge, was laid before the College, whereupon it was Resolved, that the Secretary be directed to present to Messrs. Tyson & Fisher the thanks of this Institution for their efficient and disinterested management of the Journal in the city of Baltimore.

## MISCELLANY.



*Bromine*.—M. Barruel has recently discovered a new method of obtaining bromine from a substance hitherto not used for this purpose; this process is so simple and affords so large a product that he can furnish several hundred of pounds a month, at a price not exceeding ten dollars the pound.

*Cottureau. Pharmacologie.*

*Calcined Magnesia*.—It is generally believed that calcined magnesia absorbs carbonic acid, with some rapidity, from the atmosphere, and hence that it should be kept in well closed vessels. M. Cottureau, however, states that it may be preserved for years, in bottles merely stopped with a cork, without becoming deteriorated in the slightest degree.

*Ibid.*

*Lactic Acid*.—According to MM. Pelouze and Gay Lussac, this acid may be prepared perfectly pure by the following process. Beet roots are to be subjected to pressure, and the juice thus obtained suffered to ferment for two months at a temperature of 75° to 85° F., and then evaporated to the consistence of a syrup, which will be found filled with innumerable crystals of mannite. The whole is to be treated with alcohol, which dissolves the lactic acid; this solution is to be evaporated to dryness, and the residue dissolved in water, and saturated with carbonate of zinc, which causes a large precipitate; the whole is then to be filtered and evaporated to obtain the lactate of zinc. This salt is to be dissolved in water and purified with animal charcoal and a recrystallization. These crystals are to be washed with boiling alcohol, and then successively treated with barytes and sulphuric acid, to separate the lactic acid. This is to be concentrated *in vacuo*, and dissolved in sulphuric ether to get rid of any foreign matter, the solution being filtered and evaporated, will give the acid in a pure state.

*Ibid.*

*Concine*.—In a letter from Dr. Christison to M. Robiquet, he states that he treated 40 pounds (avoirdupois) of conium seeds, according to the process of Geiger, and obtained three ounces two drachms of a tolerably

fluid oil. This oil, he adds, is the true active principle of the plant, and is one of the most virulent poisons known, having a strong analogy to strychnine. It causes death by asphyxia, from paralyzing the muscles of respiration. The heart is not affected, and the senses are perfect as long as respiration continues. This deleterious action is not modified, as Geiger, supposes, by acids; on the contrary, coneine is rendered even more active by combining it with hydrochloric acid.

*Journ. de Pharm.*

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*New Acid.*—M. Robiquet presented to the Society of Pharmacy at the meeting of the 3d February, a new acid which he had obtained by treating gallic acid with sulphuric acid. On heating the former with the latter, till sulphurous acid begins to be disengaged, the sulphuric acid assumes a bistre colour; if it then be poured in water, two precipitates are formed, one flocculent, the other crystalline and reddish; this latter is capable of saturation with alkalies; sublimes in yellowish or red crystals; is insoluble in alcohol and ether.

*Ibid.*

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*Henderson's Collyrium in amaurosis.*—

R. Strychnia,	gr. ij.
Dilute acetic acid,	ʒi.
Distilled water,	ʒi.

A few drops of this collyrium, applied to the eye, several times a day, is said to have a beneficial effect in amaurosis.

*Ibid.*

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*Guaiacic acid.*—M. Bighini announces that he has discovered a new acid in the *Guaiacum officinale*, combined with a fat volatile oil. To obtain the acid, he advises the oil to be mixed with peroxide of manganese, and this compound decomposed by diluted sulphuric acid; the new acid is precipitated. It is soluble in alcohol, and may be purified in the same way as benzoic acid. The resin of guaiacum affords a fluid on distillation, the smell of which resembles that of creosote; its taste is pungent, and when properly treated it furnishes pure creosote.

*Ibid.*

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*Proportion of Ashes in different parts of Wood.*—A portion of heart wood, of sap wood, and of intermediate layers of the trunk of an oak of sixty years of age, which had grown in a sandy loam, were separately burned. The heart yielded .27 per cent. of ashes, the middle layers .34 per cent., and the sap wood .532 per cent.—*Ibid. and Ann. des Mines.*

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*Tannate of Gelatine for taking Casts from Medals, &c.*—This substance is obtained by adding a decoction of gall nuts, sumach, oak bark, or other substance containing tannin, to a solution of glue or isinglass, in water. It is fibrous and nearly insoluble. When exposed to the air in thin layers

it hardens; when moist, it is elastic. The material which was found to give the best mixture for casts, was finely pulverized slate. Silica, emery, &c., give pastes which harden, and may be used for razor strops. In making casts of the mixture of tannate, of gelatine, and pulverized slate, it must be left for a certain time in the mould, in order to preserve the impression. If, however, it is allowed to remain there too long, it adheres strongly. The only difficulty in the application, is to ascertain the precise time required for due hardening.

*Journ. Frank. Inst. and Journ. Conn. Usuelles.*

*Orange and Lemon Syrups.*—The following recipes, it is said,\* will afford syrups that possess the same flavour as those made with the fresh fruit:

1. *Tincture of Orange Peel.*

Fresh orange peel, the inner white portion being entirely removed.

Alcohol at 22° sufficient to cover the orange peel.

Introduce into a glass stoppered bottle, and keep in a cool place.

2. *Tincture of Lemon Peel.*

Fresh lemon peel, the white portion removed.

Alcohol at 30°, q. s.

Prepare as before.

3. *Artificial Orange Juice.*

Citric acid,	℥ss.
Distilled water,	℥iv. Dissolve and add,
Tincture orange peel,	℥ij.

4. *Artificial Lemon Juice.*

Citric acid,	℥ij.
Distilled water,	℥iv. Dissolve and add,
Tincture lemon peel.	℥iss.

5. *Orange Syrup.*

Citric acid,	℥iv.
Distilled water,	℥ij. Dissolve and add,
Simple syrup,	lb. viij.
Tincture orange peel.	℥ij.

6. *Lemon Syrup.*

Citric acid,	℥iss.
Distilled water,	℥iv. Dissolve and add,
Simple syrup,	lbs. viij.
Tincture lemon peel,	℥iv.

*Ibid.*

*Hunt's Writing Ink.*—

Powdered galls,	lbs. viij.
Rasped logwood,	lbs. iv.
Gum Arabic,	lbs. iij.
Sulphate iron,	lbs. iv.
Sulphate copper,	lb. j.
Sugar candy,	lb. j.
Gum ammoniac,	℥ij.
Distilled water,	O xvj.
Alcohol,	O ss.

Macerate for forty-eight hours with heat, and after ten days draw off the ink into bottles. *Journ. de Conn. Usuel.*

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*Antiphlogistic Syrup.*—The following syrup has been much used in Paris in chronic catarrhs, rheumatism, &c.:

Jujubes, dates, figs, raisins,	<i>aa</i> ℥ss.
Pectoral flowers,*	℥ij.
Poppy flowers,	℥i.
Gum Arabic,	℥iij
Mucilage of marsh mallows,	℥ij.
Mucilage of flaxseed,	℥i.
Orange flower water,	℥ij.

White sugar and distilled water q. s. for lb. ij. of syrup.

Make a decoction of the fruits, strain and boil; add an infusion of the flowers and again strain, then add the mucilages, sugar, &c. and form a syrup. *Ibid.*

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*Decolouration of Oils.*—M. Piussan, apothecary of the hospital of Oleron, states that oil bleached by being placed in contact with animal charcoal for twenty four hours, was used in the preparation of an ointment; this was beautifully white, but was much less consistent than that made with the crude oil. Olive, poppy and almond oils, thus treated, remain so fluid, that they require a fifth more of wax to give them a proper consistence. They do not concrete at a much lower temperature than that at which they congeal in their ordinary state, and hence may be advantageously employed by watch-makers. *Ibid.*

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*Palm Wax.*—The wax of the *Ceroxylon andicola*, when melted, is of a dark yellow, somewhat transparent; it is almost as brittle as resin, but at the same time has a wax-like fracture. It melts at a temperature a little

\* The pectoral flowers are those of the Mallow, *Althea*, *Gnaphalium*, *Tussilago*, *Violet*, and *Red Poppy*.



over that of boiling water; becomes electric by friction, burns with a bright flame, but gives out much smoke. Alcohol and ether readily dissolve it with the assistance of heat; the caustic alkalies act on it with difficulty, but finally dissolve it. If it be treated with a great excess of boiling alcohol, a resinous principle can be separated, which, on cooling, remains in solution in the alcohol, whilst the wax precipitates. This purified wax melts at a temperature below that of boiling water, and presents all the physical and chemical characters of bees-wax. The resin is of a dazzling whiteness, and its structure is evidently crystalline. When it is melted, it has the colour and aspect of amber. It is soluble in alcohol, but much more so in hot than in cold. It is also soluble in ether and in the essential oils. M. Boussingault gives as its composition, C.40, H.32, O.

*Journ. de Pharm.*

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*Size for Painting in Water Colours.—*

Isinglass,	℥ij.
White soap,	℥ij.
Alum,	℥iss.

The isinglass, cut into small pieces, is to be swelled in a little tepid water for some time, and then dissolved with the assistance of heat in from four to eight ounces of water, and the alum and soap finely powdered and gradually added; the whole is to be well stirred, and a drachm of spirits of wine added by very small portions at a time.

*Journ. de Conn. Usuelles.*

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*Creosote.*—M. Koene finding that wood tar furnished only a minute proportion of pure creosote, and that what other chemists have pretended to have procured from this source was nothing more than a peculiar heavy oil, merely impregnated with creosote, tried other sources, and by operating in the following manner, obtained ten drachms from a quart of coal tar. He distilled the tar in a retort furnished with a long adapter with a large mouth, under which he placed a capsule. He obtained, at first, a light volatile oil, and at last a heavy oil; he continued the distillation, raising the temperature until naphthaline began to concrete in the neck of the retort; there remained in the adapter a certain portion of heavy oil, united to naphthaline, of a butyraceous consistence, which he disengaged by slightly heating the adapter. This was mixed with the last mentioned oil and exposed to cold to separate the naphthaline. To obtain all the creosote, he heated this naphthaline with its own weight of pyroligneous acid. On cooling, the naphthaline crystallized, and could be wholly separated from the fluid, which was saturated with carbonate of potash. The heavy oils were treated successively with one-fortieth of their weight of phosphoric acid and their own bulk of water. The water was separated, and the oil distilled, the light oil which comes over first being rejected.

The rectified oil was dissolved in potash, and the free creosote separated by means of a slight excess of diluted phosphoric acid; again distilled, and on the rejection of the water which first passed over, pure creosote was obtained.

*Journ. de Pharm.*

*Ointment for the Itch.*—Dr. Lison, physician of the Hospital of Donzi, speaks in high terms of the efficacy of the following ointment in itch:

R. Litharge,	℥i.
Olive oil,	℥iv.

Mix and heat over a moderate fire, stirring continually, till the ointment acquires a slightly blackish colour.

*Journ. Gen. de Therap. and Am. Journ. Med. Sci.*

*Syrup of Punch.*—

Simple syrup,	lbs. xxiv.
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Evaporate rapidly to 20 pounds, and prepare an infusion of

Green tea,	℥ij. in
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Boiling water,	℥xvj.
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Mix this infusion with the syrup in a closed vessel, and add

Rum,	lb. vj.
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Alcohol 36°,	lb. ij.
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Citric acid,	℥i. dissolved in water, ℥iv.
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Tinct. of lemon peel,	℥iss.
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Mix, and when cold, put in bottles and keep in cool place.

*Journ. de Conn. Usuelles.*

*Action of Nitric and Sulphuric Acids on some Organic Substances.*—M. Couerbe observes, that, struck with the analogous properties of narcotine and thebaine, (paramorphia) he endeavoured to discover what were their differential characters. He found that narcotine, when placed in contact with cold nitric or sulphuric acid, underwent no change of colour, but that when it was subjected to the action of a mixture of these acids, it assumed a beautiful blood-red tint. This is so sensible a test, says he, that with the assistance of narcotine, the presence of a single drop of nitric acid can be detected in one or even two pounds of sulphuric acid. He satisfied himself that this production of colour was owing to the disengagement of oxygen by the reciprocal action of the two acids, and that the same phenomenon can be produced by passing oxygen through a mixture of narcotine and sulphuric acid. By employing the protoxide of azote instead of oxygen, an analogous result is obtained, but the colour is less vivid, whilst with atmospheric air, the reverse is the case. M. Couerbe subjected the immediate principles of opium to the action of his new reagent, by violently agitating six grains of each substance with above half an ounce of the acid mixture, with the following results:

Thebaine.—Instantly reddened, becoming darker with time, presenting a yellowish reflection when examined in thin layers.

Narcotine.—First changed to a yellow, but after the lapse of a few minutes, (7 to 8) becoming red.

Codeine.—First becoming of a faint green, then changing to violet green.

Morphia.—Almost immediately assuming a brown red.

Meconine.—At first no change, but in twenty-four hours becoming of a rich rose colour.

Narceine.—Immediately changing to a mahogany red colour.

*Journ. de Pharm.*

*Analysis of Pyrethrum.*—M. Koene has found this root to contain 1st, a brown, very acrid substance, of a resinous appearance, insoluble in caustic potash 0.59; 2d, a fixed oil of dark brown colour, very acrid, soluble in potash 1.60; 3d, a yellow acrid oil, soluble in potash 0.35; 4th, traces of tannin; 5th, gum 9.40; 6th, inuline; 7th, sulphate, hydrochlorate and carbonate of potash, phosphate and carbonate of lime, alumine, silex, &c. 7.60; 8th, woody fibre 19.80—loss 2.60=100. *Ibid.*

*Rhus radicans.*—G. Sella recommends the *Rhus radicans* as an excellent dye. For eight parts of wool, take of this plant, previously boiled, eight parts, alum one part, cream of tartar one-sixth part, muriatic acid solution (muriatic acid four parts, pure tin one part) 1 part. Boil for three-quarters of an hour; a fine yellow is produced. If the dried plant be used, a pale yellow or hazel colour is obtained. These colours resist soap and the sun as well as the other yellow colours. It becomes more stable if allowed to remain for twelve hours in the vat.

*Arcana. Science.*

*New method of drying Plants.*—Dr. Hunfeld has announced a new method of drying plants, by covering them first with powder of lycopodium, and then placing them in a vessel containing chloride of calcium. By this method the colour and flexibility are retained. On the 29th July, 1831, Dr. Goppert of Breslaw, placed in a 24 ounce glass, two leaves of the hyacinth, and a specimen of the *Fumaria officinalis*, with two ounces of chloride of calcium, in such a manner that the plants were not in contact with the salt; on the following day the leaves began to dry, and on the 3d of August, although not dead, the hyacinth leaves could be reduced to powder. Even succulent plants, as the *Sedum rupestre*, are so much dried in a week that they may be powdered. The use of the lycopodium is to prevent the sap from escaping. *Ibid.*

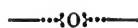
*Crystallized oxychloride of Mercury.*—M. Malagutti states that when a large proportion of water is added to an acid solution of protochloride of antimony, an abundant white precipitate is immediately formed, which when properly washed consists of two atoms of protoxide and one atom of protochloride of antimony; if, on the contrary, instead of removing the precipitate, it is left in the fluid for a day or two, it becomes much diminished in size, and is finally converted into thick and crystalline layers. This new compound, when washed and dried, is in the form of small prismatic needles, white, shining and decomposed into pure oxide of antimony, by boiling in water, by prolonged washings, and by the alkaline carbonates. These crystals are wholly soluble in nitric acid, and when subjected to the action of heat, lose most of their chlorine. On analysis they were found to be composed of:

Protoxide antimony,	74.51
Protochloride antimony,	25.70

When sulphuret of antimony is treated with hydrochloric acid, somewhat diluted with water, in order to obtain sulphuretted hydrogen, the fluid above the unattacked sulphuret becomes red on cooling. If this fluid be decanted and mixed with a great quantity of water, a very copious, yellowish precipitate is obtained, which in a few days is reduced to a thin layer, formed of minute crystals of a beautiful red colour. M. Malagutti subjected these crystals to analysis, and found that they were oxychloride of antimony, coloured by variable quantities of sulphuret of antimony. It was even easy, on examining them with a microscope, to discover that the colour was owing to a foreign body, unequally distributed between the crystals.

*Journ. de Pharm.*

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**ORIGINAL COMMUNICATIONS.**

ART. XXV.—NOTES ON THE SPECIES OF CASSIA WHICH  
YIELD THE SENNA. By JOSEPH CARSON, M. D.

THE information which has been published with regard to the history of such plants as enter into the composition of Senna, is scattered through numerous memoirs, either general in their nature, or specifically devoted to this subject. It has always appeared to us that the task of going over the whole ground of the knowledge possessed, would not be useless, if, from the materials thus obtained, a succinct account were drawn up of the labours of those who have investigated this conspicuous article of the *Materia Medica*. From the desire to add our mite to the treasury of science, we have been induced to undertake this task, in the hope that it may prove acceptable to those whose opportunities for reference are limited.

The plants which yield the Senna belong to the *Natural Order* Leguminosæ. *Tribe* Cassiææ. *Genus* Cassia. *Section*, Senna. DECANDOLLE, *Prodrome*.

Sexual System. Decandria Monogynia.

*Cassia*.—Sepals five, hardly coalescing at base; more or less unequal; stamina ten; unequal, free, three inferior longest; four middle, short and straight, three superior rudimental, with abortive anthers. Anthers dehiscent at the apex, ovary stipitate often curved. Legume varied. Trees, shrubs, or herbs.

Leaves simply and abruptly pinnate. Petioles often glandulous. Folioles opposite.

*Senna*—Sepals of the calyx obtuse, anthers biporous, legumes membranaceous, broad, flat, compressed, many-celled, with transverse septa, hardly dehiscent, torous over the seed, scarcely pulpy within; seed vertical, parallel to, and compressed by the valves, nearly obcordate, shorter than the funiculus.

In the shops there are two kinds of *Senna*—designated by the common appellations of Alexandrian and Indian. But with regard to the plants which afford these commercial articles respectively, considerable discrepancy and discordant statements are met with, attributable in a great measure to the difficulty of procuring and observing them in their natural state, and to the vague and indefinite language in which the most authoritative descriptions of them have been given, as likewise to the neglect of many minute circumstances, the observation of which would have tended to shed light upon those seemingly more important. Although from these causes the want of conclusive details renders many points doubtful, yet the nearest approximation to the truth can only be obtained by setting forth and contrasting the material facts asserted by different writers, so as to facilitate in correctly estimating the value which ought to be attached to them, and in establishing a sure basis for further additions to our knowledge. All systematic authors who have treated of the different officinal *Sennas*, derive their statements from the accounts of travellers and botanists who have visited those countries in which they are produced, and therefore would seem entitled to confidence; the extent to which they are to be relied on will be seen in the sequel. But another method has been taken to obtain a knowledge of the several species of plants under consideration; it is by an examination of the article prepared and brought into the market for sale, and it will at once be perceived that this method is liable to numerous objections. Although in this way the species which are accurately known may be readily recognised, yet it is hardly warrantable to



form a new one from the scanty materials thus obtained, and the danger of mistaking variable characters for specific differences, so apt to occur even where every facility is afforded, is so great, that attempts of this kind should be discouraged.

We shall first investigate the history of the species which form the Alexandrian Senna of commerce. In the composition of this prepared article, it is admitted that two distinct species of Cassia are to be detected. One of them with acute, the other with obtuse leaves. Although the difference between these two was known to LINNÆUS, yet he chose to look upon the distinction as variable, and therefore comprehended both under the name of Cassia Senna, considering them as varieties of one species. At that period the acute leaved Senna was known by the specific name of *Alexandrina*, and the obtuse leaved one by that of *Italica*. In the same way they had been regarded by the older authorities, and MORISON in his *Hist. &c.* has given figures of both varieties; his work was published in 1680.

LAMARCK in the *Dictionaire Methodique*, Art. Cassia, separated these two varieties into distinct species, and upon the authority of FORSKALL called the plant with acute leaves, *Cassia lanceolata*, while he still retained for the one with obtuse leaves the term *Cassia senna*. In this state our knowledge of the plants yielding the Alexandrian Senna remained until the period of the memorable invasion of Egypt by Buonaparte. A commission was then formed to investigate the Natural History, as well as the monuments of Art of this most interesting country. The commission formed itself into an Institute well known by the scientific world as the Institute of Cairo. To the labours of this body much credit is due, and not the least portion of it to the individuals who devoted themselves to the Botanical department.

The investigation of the genus Cassia appears to have occupied a prominent place in their estimation, as two members of the commission have deemed it of sufficient importance to devote separate essays to it; each of them presenting the facts which came within the sphere of his personal observation.

To these essays it is our design to bestow especial attention, as from them almost all the information collected by systematic writers has been obtained.

The two species of acute and obtuse leaved Cassia, were immediately recognised by ~~both~~ MM. DELILE and NECTOUX, the individuals referred to, not only upon examining the drug prepared for exportation and stored at the depot (Boulac) but also in the localities where they discovered them growing; situated in Upper Egypt contiguous to the Cataracts of the Nile.

We shall now present DELILE's account of the first of these two species; he has named it *acutifolia*.\*

*Specific description.* "C. acutifolia, caule suffruticoso, foliis pinnatis, *petiolo eglandulato*, foliolis 5-9 jugis, lanceolatis, acutis, leguminis ellipticis, facie utraque nudis, margine superne arcuatis. *Cassia lanceolata*. Nectoux. Non vero Cassia lanceolata FORSKALII, *petiolis glandulosis distincta*.

NECTOUX† has named the plant under consideration Cassia lanceolata, entertaining the opinion that the name derived from FORSKALL should not be changed, and believing that this author had reference to the same. He gives the following description of it: "This plant is designated first by its pinnate leaves, composed of from four to six pair of oval lanceolate folioles, a little villous all over; second *by a gland at the base of the petiole, and another between each pair of folioles*; third by the oval oblong flattened legumes. Conflicting as these two accounts may appear, still indisputable evidence exists to show that each of them refers to the same identical plant. The authors were both attached to that division of the French Army which penetrated into Upper Egypt; they therefore visited and speak of the same localities at the same season of the year, and DELILE admits that the plant described by him is the one described by his colleague. The Committee appointed by the National Institute to examine

\* Floræ Egypticæ illustratio. Auctore A. R. DELILE. Description de l'Egypt, &c. Hist. Naturelle, tom. 2d.

† Voyage dans la Haute Egypte au dessus des Cataractes, &c. par H. Nectoux.

the memoir of M. NECTOUX were led to the same opinion, and reported accordingly. There is a passage in this memoir which implies a knowledge of contemporaneous publications and even evinces a little feeling of jealousy on the part of the writer; he there states "that he can affirm that he is the only one who has verified upon the spot, the principal facts presented in this memoir, though he may not have been the first to bring them before the Institute."

The two descriptions given above are at issue as regards the existence of glands upon the petiole, and also as to the idea intended to be given of the form of the leaflets. Now, the question arises, admitting the same species to have been seen by both observers, are the characters specified so changeable as to allow an explanation founded upon the variable nature of which all plants, more or less, partake? It is well known that in comparing a long series of specimens appertaining to a single species, they may be so arranged that an individual specimen, at one end of the series, may be so widely different from another, at the other end, as to lead to the impression that they are distinct, but yet, by progressing through each link of the chain of analogies, the resemblance between contiguous specimens is so close as to preclude the possibility of separating them, and therefore the identity of the whole must be maintained. Great disparity also arises from the condition of advancement at which plants are observed; as also, from the nature of the soil, exposure to light, heat and other physical circumstances incident to the locality in which they grow. The demand for Senna in Europe, according to the confession of the native agents, having charge of the depots, is greater than the supply of such as is considered of the best quality, which is cultivated in the country of the Barabras; hence it became the practice to make up the deficiency by introducing that which in the neighbourhood of the depots most remote from Cairo, is called "wild" (*sauvage*) or uncultivated; this fact is of vast importance in estimating the causes of variety.—These considerations must have decided influence in explaining the want of uniformity, and proneness to

vary in shape and size, which the leaflets manifest, and it may be doubted whether the invariable existence of a glandulous petiole has much greater claim to confidence. Upon referring to the plates connected with the memoir of each, it will be perceived that the figure given by DELILE is evidently taken from a plant in an advanced stage of maturity, after the flowers had disappeared, the legumes of which were well formed and had attained their full size and consistence. But the drawing of NECTOUX is taken from a specimen to which the flowers were still attached, and when those legumes which had been fecundated were not more than half or two-thirds advanced. The impression is also given by this representation that it was made from a specimen not the most vigorous, but on the contrary somewhat impoverished and stunted.

Upon examining the leaflets of the Alexandrian Senna which comes to this market, all varieties of shape and size are met with. By far the most frequent however of the acute are found such as answer to the figure of NECTOUX, but at the same time there are a certain number in each quantity which correspond to that of DELILE. It is therefore plain that in the series of varieties, the one selected an individual specimen as the representative of the type, at one end or the commencement of the series, while the other selected from the opposite end or the termination of it.

If the two plants described above are, as we believe, the same, and little doubt can exist that such is the case, we may now proceed to the *C. lanceolata* of FORSKALL. The assertion of NECTOUX that his plant is identical with the one described by FORSKALL has been noticed. The description is as follows:

*Cassia lanceolata*, foliolis 5 jugis, lanceolatis æqualibus.

*Description*.—Foliola pollicaria,—breviter petiolata, lanceolata, viridia, glandula sessilis supra basin petioli. Pedunculi racemi terminales longi, pallide flavi. Legumina linearia, villosa, compressa incurva, *matura non vidi*. Surdud. Arab. Suna. Etiam circa Mor frequens.

Certiozem mihi fecit quidam hanc Cassiam veram esse Sennam Meccensem, cujus folia Kahiræ huic nostræ simillima

vidi, nec ovata ut vult character Sennae. Senna Meccæ Lohajæ inveniebatur foliis 5-9 jugis lineari-lanceolatis. E territorio Abu-ausch magna copia Djiddam deportatur, quam eandem esse ajunt Kahiræ vulgarem nomine Sennæ Meccæ et in Europa Sennae Alexandrinae.\*

From this description, which agrees pretty closely with those detailed before, and from the accompanying remarks, it would seem that FORSKALL entertained the belief that he was describing the Senna Alexandrina, or that with acute leaves (foliis acutis) of the older writers. It does not appear that any other Senna with acute leaves was found at Cairo. The clause, "Senna Meccæ Lohajæ inveniebatur foliis 5-9 jugis lineari-lanceolatis" would favor the opinion that something different was alluded to; and this may have been the case, but it does not interfere with the entire account, as it merely expresses the fact that a plant having the peculiarities noticed was also met with at Lohaia, and it may have been either a simple variety, or a distinct species confounded with the other under the name of Senna Meccensis. We can readily believe that a single species can be a native of *countries so contiguous* as Arabia and Egypt; so that the statement that this plant, more peculiar to the latter, is found in the former, should be received, provided there exist no inherent evidence to weaken confidence in it. The designation, *Meccensis*, must have been taken from the place of deposit, in the same way as the term *Alexandrina*; these are merely local appellations arising from the mode of conducting commerce in those countries.

The circumstance on which DELILE founds the distinction between his plant and that of FORKSALL, is the occurrence of a gland upon the petiole of the latter. Now it has been seen how much weight this ought to have, when in describing the plant acknowledged to be the same, he and NECTOUX are at variance upon this very point; and with regard to other apparent discrepancies, it can only be said that, even at the present day of studied accuracy in description, it will be found that the

\* Flora Ægyptiaco Arabica, &c.

most keen sighted observers vary in the terms used to convey an idea of the same thing, and that among earlier botanists, when the number of known plants was less, the same nicety of distinction was not regarded. DECANDOLLE, from whose authority there can hardly be an appeal, from a review of all the facts, has thought proper to adhere to the division of LAMARCK; he has suppressed the species *acutifolia* and merged it into *C. lanceolata*, the original title.

MERAT and DE LENS in their valuable Dictionary of the Materia Medica have given place separately to the *C. acutifolia* of DELILE and *C. lanceolata* of FORSKALL, this separation seems to us founded in a great measure upon conjecture, and it will be seen hereafter that they are too much inclined to multiply species.

M. RICHARD\* has received the assertion of DELILE, and M. FEET† appears undetermined, but conjectures that they may be only varieties.

Synonymes of *Cassia foliis acutis*.

*C. Senna*. variety *Alexandrina*. *Lin. Willdenow.*

*C. Acutifolia*. *Delile.*

*C. Lanceolata*. *Forskall, Lamarck, Nectoux, Decandolle.*

*Senna orientalis*. *Persoon.*

*S. de la Palte, de la ferme, du Said.*

*Senna guebelly*—Arab, meaning *wild*, or from the mountains. *Nectoux.*

*Senna Meccensis*?—apparently a general name.

The next species which makes a portion of the Alexandrian *Senna* is the one with obtuse leaves, now universally known by the appropriate name *C. obovata*, from the obovate form of the leaflets.—With regard to this species, no question of doubt has been raised, as the well marked characters which belong to it are difficult to be mistaken. DELILE and NECTOUX agree in every particular in the description of this species, but have added little to the botanical History of it. The description is as follows.—It is from a foot to a foot and

\*Histoire Naturelle Medicale.

†Cours d'Histoire Naturelle Pharmaceutique.

a half high,—its stem which is pubescent at base, is cylindrical, the leaves are alternate, composed of from four to seven pair of folioles, opposite, almost sessile, oboval, cuneiform, very obtuse, somewhat mucronate, thin below and inequilateral. They are slightly pubescent, of a yellowish green colour and having at the foot of the main stalk two subulate entire persistent stipules. The flowers are pale yellow, and are disposed in clusters upon the peduncles, which are axillary, and longer than the leaves. The pods or legumes, which from their foliaceous appearance have been erroneously named folliculi, are flattened and are from twelve to fifteen lines long and five or six broad; they are curved so as almost to be remiform, and are of a greenish brown colour. On each side are to be observed small transverse elevations corresponding to the seed, and covered with a minute pubescence requiring the aid of the glass to be detected. The seeds are black, heart-shaped, and not inaptly compared to the seeds of raisins. LAMARCK has almost as fully entered into these details as the later writers, and as he is the first who presents a *satisfactory* systematic account of this species, it is highly creditable to this accomplished author. It is not our intention in this paper to enter into the details of locality, commercial preparation and history of the Sennas, as they can be obtained from most of the books upon Pharmacy, and Materia Medica. The National Dispensatory of Drs. Wood and Bache contains all that is known upon these points.

Synonymes of *Cassia foliis obtusis*.

*Cassia Senna* var. *subovatis*. *Lin. Willd.*

*Cassia obovata*. *Colladon.*

*Senna Italica*. *Morrison.*

*Senna belledy* (wild.) *Nectoux.*

NECTOUX has given an excellent figure of this species, drawn by H. S. REDOUTE whose skill in delineating plants is unrivalled.

MM. MERAT and DE LENS have made a new species which they call *C. ovata*. They assert that they have detected it in the bales of Senna from Tripoli brought to Marseilles. We



have previously entered our protest against admitting new species founded upon such slender evidence, and the reason alleged in palliation of this procedure in the present instance cannot be upheld without detriment to Science, in as much as what is positively ascertained would be rendered obscure and complicated. They assert that this species should be separated, if solely for the purpose of attracting the attention of Naturalists to it. Undoubtedly the fact of the existence of differences in the character of the plants which enter into the commercial article should be pointed out and minutely noted, but the liberty of adding a new species to those already known must be based upon more certain materials than the broken fragments making up the aggregate of a bale of Senna. The general principles of varieties, already alluded to, will afford a clue to the explanation of the statements which they make. According to their account the species "is composed of small folioles exactly oval, acute at the summit, lightly pubescent below, at least in the vicinity of the midrib; they are fragile, of a pale green, and most frequently broken, the folliculi are thin, pale yellow, a third smaller than those of the preceding species, and not curved as they are; they contain some cordiform whitish seeds, with little trace (prominence) of them in the middle of the pods." It is to be remarked that these are found in the Senna from Tripoli, well known as an inferior article, composed for the most part of the Cassia with acute leaves, and from the description, it is apparent that the portions of the specimens alluded to are in an immature state; so that the question might be settled from these circumstances without further comment. But they state that there is a similarity between the plant thus distinguished, and the figure of *C. lanceolata* given by COLLADON, which is confirmative of the view we have taken, and evinces that this author was unfortunate in the selection of his specimen, not that he was mistaken in his plant. The dissimilarity of the figures of DELILE and NECTOUX has been noticed, and the same general remarks apply here, as also the great variety in the shape and size of the leaves and pods of the genuine Alexandrian Senna.



If the principle which has actuated these deservedly eminent writers, were fully carried out and acted upon, there would in fact be no end to the multiplication of species.

(*To be continued.*)

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ART. XXVI. ON SULPHATE OF QUININE.

(*In answer to Art. XL. Vol. I. Am. Jour. Pharm.*)

[Several communications have recently been received by the Committee of Publication from M. DELONDRE and his agents in London and New York, respecting the adulteration of Sulphate of Quinine, supposed to be of his manufacture, on which a report was made to the Philadelphia College of Pharmacy in December last. In justice to the parties, it has been deemed best to lay these communications before our readers without comment.]

In a letter addressed to the College under date of Nogent sur Marne, 15th May 1836, Mr. DELONDRE observes:

“It was not until yesterday, that I was enabled to obtain a sight of the article you have published on Sulphate of Quinine of my manufacture, and the report of your committee of inspection on the same.

“The tone of truth, moderation and science, that characterizes this memoir, has induced me to make some observations in reply, which I beg you will dispose of as you may deem best.

“I no longer expose any Quinine for sale under my own name, the union of three rival manufactories having entirely changed my position in this respect; hence it is not from pecuniary motives that I now enter into these explanations, but from a due regard to my reputation.

“In the first place, I do not seek to throw any censure on the workmen I employ, as I *personally* direct all operations

carried on, and hence all the responsibility must devolve on myself alone.

“As you have, however, offered me this excuse, and I have thus declined it, I trust that you will credit me in stating that I never have knowingly augmented any product by foreign admixtures, but that on the contrary, my constant aim has been to render every article as pure as possible, with a due regard to economy in the process. Besides which, the very presence of the workmen in my establishment would in itself be a guarantee of my good faith; it would be scarcely possible to place them all in my confidence and pledge them to secrecy.

“I therefore pass over this point, and will now detail to you the mode in which I operate, that you may perceive the cause of the combination of foreign substances you have pointed out in a lot of my sulphate of quinine.

“The contused bark is subjected to several decoctions in water sharpened with hydrochloric acid; these decoctions are precipitated with milk of lime. The precipitates are drained, washed, subjected to pressure and placed in contact with alcohol at 36°. The alcohol containing all the quinine contained in the precipitates is then distilled, affording a residue of crude quinine.

“This crude quinine is combined with sulphuric acid and animal black to decolourize it. The crystals that result from this operation are washed, drained, and again treated with sulphuric acid and animal black, affording white crystals fit for sale.

“The coloured mother waters, and the washings are precipitated by liquid ammonia, and this precipitate treated as above; the washings from this operation are then treated with alcohol as in the first instance. The mother waters of the white crystals are also precipitated by means of ammonia, and the precipitates treated with sulphuric acid and animal black, affording less perfect crystals than the preceding, but equally white and pure. The washings are treated with alcohol, &c.

It may be seen that in these various decolourations and crys-

tallizations, there is much animal black and residues from filtrations which retain much quinine. For a long time I subjected these residues, &c. to a treatment with hot acidulated water, after a sufficient quantity had become accumulated to render it worth while; this solution was precipitated and crystallized in the usual manner.

“When I received the account of your experiments, I carefully examined every step of my process, and paid especial attention to the treatment of the animal black and filters, and discovered that the action of the sulphuric acid was sufficiently powerful to act on the animal charcoal, in the different washings, and thus to carry off a portion of the phosphate of lime and magnesia contained in it.

“To remedy this I now drain the precipitate perfectly and treat the washings with alcohol, and it is remarkable that I thus obtain a larger and whiter product than heretofore, notwithstanding the bulk of the first was increased by the foreign admixtures.

“Hence according to the quantity of these residues operated upon, might be the proportion of foreign substances, though wholly unknown to me, and even to my loss. I have carefully analyzed several lots of the quinine of commerce, and found that much gave  $\frac{2}{100}$  to  $\frac{3}{100}$  of impurities, and in the impure residue after calcination also found in commerce, I have found  $\frac{6}{100}$ , and in one instance,  $\frac{8}{100}$ .

“Since the adoption of my new method, I test the product of each operation, and have not found more than  $\frac{1}{100}$  in the residue by incineration, and no appreciable portion in that by alcohol.”

Mr. DELONDRE concludes by stating that he has requested his agent in London to transmit 25 oz. of his Sulphate of Quinine to the Philadelphia College of Pharmacy, to experiment upon and otherwise dispose of, as may be deemed most expedient. He also adds that any additional details will be furnished that the College may desire.

Mr. DELONDRE also transmitted a certificate from Mr. BUSSY, Professor of Chemistry in the School of Pharmacy at

Paris, &c. stating that at the request of Mr. DELONDRE he had visited his manufactory of Sulphate of Quinine at Nogent sur Marne, and had taken for specimens of one ounce each from a lot of two thousand ounces packed up for New York.

"The four specimens were marked 1, 2, 3, 4, and subjected to the following experiments:

1. "The quinine was subjected to a heat of  $212^{\circ}$  F. for three hours to determine the quantity of water of crystallization.

2. "Another portion was calcined till all organic matters were destroyed, to ascertain if it contained any salts or other inorganic substances.

3. "It was treated with alcohol at  $36^{\circ}$ .

4. "It was subjected to the action of water to which a small quantity of sulphuric acid had been added.

5. "A solution of the Sulphate was decomposed by means of ammonia, thus giving a precipitate of Quinia; and the liquid was examined to ascertain if it contained any foreign substance, as sugar, &c.

"The result of these experiments was as follows.

"Water of crystallization in the 100 parts,

1.	12.		2.	12.		3.	11.		4.	12.
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"Theory indicates 15 to 16 per cent. of water of crystallization in this salt; BERZELIUS, v. p. 159; DUMAS, v. p. 747. This difference may be explained by supposing that some portion of the salt had effloresced.

The calcination of a 1000 parts gave of incombustible residue:

1.	8.		2.	8.		3.	4.		4.	6.
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"The four specimens when treated with alcohol, were perfectly dissolved, leaving no appreciable residue.

"They were also completely soluble in water to which a little sulphuric acid had been added.

"Finally, the aqueous solution decomposed by ammonia,

furnished a fluid which when evaporated almost to dryness, was found to contain no foreign body."

In a letter from Mr. CAZENOVE of London, the agent of Mr. DELONDRE, after stating he had forwarded twenty-five ounces of Sulphate of Quinine, as requested by Mr. DELONDRE, he goes on to say:

"The analysis given in the report of pure Sulphate of Quinine is no doubt correct, but I believe that very little is made in a large way which contains less than  $\frac{2}{100}$  to  $\frac{3}{100}$  of impurities, arising from the ingredients used in its manufacture, all of which are mentioned in Mr. DELONDRE's clear and candid statement of his process."

The last document on the subject is a letter from Dr. J. R. CHILTON of New York, in which he says that Mr. FEIDLER, the agent of Mr. DELONDRE in New York, states that he has ascertained that the article examined by Mr. FARR and others was not imported by him, but came last from London, where it may have been adulterated and then branded in imitation of Mr. DELONDRE's.

Dr. CHILTON adds, "I have made two or three examinations of DELONDRE's Quinine as imported by Messrs. FEIDLER & Co. at different times, and have uniformly found it to be almost entirely free from impurity."

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#### ART. XXVII.—MEDICO-BOTANICAL NOTICES. NO. XI.

*Lobelia Syphilitica*.—This beautiful native plant, like the other species of its genus, acts as an emeto-purgative. Its principal celebrity, however, has arisen from its supposed powers in the cure of syphilis, for which purpose it was highly esteemed among the Indians of this country, and the knowledge of its powers long kept as a secret among them, but was at length communicated to SIR. WM. JOHNSON, who

transmitted an account of it to Europe. It did not, however, attract much notice until KALM, who also heard of its reputed powers, whilst among the Indian tribes in Canada, induced somewhat extended trials of it; the results were at first thought to fully justify the praises bestowed upon it by KALM, and LINNÆUS in Sweden, HAVERMANN in Germany and DEPAU in France. But subsequent experiments have by no means confirmed the accuracy of their statements respecting its powers, and it is now seldom if ever employed, though there can be but little doubt that it is an active article, and applicable to all cases in which the *L. inflata* has proved so eminently successful. From an analysis by M. BOISSEL, it appears to contain a fatty matter of the consistence of butter, a saccharine matter, mucilage, super malate of lime, malate of potassa, traces of a very volatile, bitter substance, &c.

*Lycopus*.—Several species of this genus, it would appear, are possessed of much higher powers than are generally attributed to them. The *L. Europæus* has long been employed in various parts of Europe in domestic practice as a febrifuge, and in Piedmont, where it is known under the name of *erba china*, it is considered as equal to the Peruvian bark. Dr. RE, of Turin, who experimented with it largely, states that in doses of two drachms it seldom fails in arresting the paroxysms of intermitting fevers. Dr. BROFFIERO, of the same place, confirms the statements of Dr. RE, and adds that it has proved highly useful in his hands as an astringent.

The American species are very analogous in their medical properties, and have proved highly efficacious in the hands of several practitioners especially in New York and the New England states, where they appear to have been extensively experimented with. Drs. ROGERS and PENDLETON, of New York have published several cases of pulmonary disease in which this remedy was of the greatest benefit. In fact, from the concurrent testimony of many eminent members of the profession, there can be little doubt that it acts in a prompt manner in restraining internal hæmorrhagies, especially hæ-

moptysis. The whole plant is employed, either in powder or infusion. It has a peculiar, and somewhat terebinthaceous smell, and a slightly bitter and rather unpleasant taste. These properties in a great measure depend on the presence of a peculiar essential oil, though from the general effects of the remedy, it is probable that some other active principles are conjoined to it. No analysis has been made of it, and hence we can only speak from analogy.

*Pariera brava*.—Under this name the roots of several plants are confounded in commerce, and the best writers on *Materia Medica* evince great uncertainty in their descriptions of it. DECANDOLLE considers the genuine article to be the product of the *Cissampelos pariera*, as this is certainly the root spoken of by SLOANE and others. As far as we have been able to investigate its synonyma it appears to be the

*Clematis baccifera*, &c. SLOANE. Jamaica I. 200.

*Convolvulus Brasiliensis*. RAY. Hist. plant. 1331.

*Caapeba*. MARGRAVE. Brasil 24. PISO. Brasil. 94.

*C. folio orbiculato*, &c. PLUMIER. Gen. 33.

*Cissampelos scandens*. BROWNE. Jamaica 357.

*C. caapeba?* LINNE. Sp. Pl.

*C. pariera* LINNE. Sp. Pl. DECANDOLLE Syst. I. 533, &c. but not of AINSLIE, Mat. Med. Ind. II. 315.

It is known in Jamaica under the names of Velvet leaf and Ice vine. It grows in great abundance in that island in the mountainous districts, attaining a great size, covering even the tallest trees with its velvet-like foliage. It also occurs in several others of the West India islands and was discovered by HUMBOLDT in South America, where it had been previously noticed by MARGRAVE and PISO. AINSLIE speaks of it as a native of the East Indies, but it appears from more recent observations that his plant is another species the *C. Mauritiana*, though endowed with analogous remedial properties.

The first notice we have of the *Pariera* was from MARGRAVE and PISO, who mention a root employed by the na-

tives of Brazil under the name of *Caapeba*, in certain diseases of the bowels and urinary passages; this plant was erected into a species by LINNE, under the name of *Cissampelos caapeba*, and may be distinct from the *C. pariera* though it appears probable from the identity of their medicinal properties, that they are at most but varieties of the same species. In fact, MERAT and DE LENS state that there is every reason to believe that the *C. Guayaquilensis* and *C. argentea*, HUMBOLDT, as well as the *C. microcarpa*, DECANDOLLE; are identical with the *C. pariera*. As before mentioned, the *Pariera* of AINSLIE is the product of another species, as is also that of AUBLET.

The pariera was introduced into medical practice by the Portuguese, and at one time was much employed in diseases of the bladder and kidneys, but from one of those unaccountable changes in the opinions of the medical world that have so often taken place without our being able to assign any adequate reason, it rapidly sunk in almost perfect oblivion, till within a few years past, when it has again begun to attract attention, and has been shown to possess most unequivocal powers in certain affections of the bladder. As found in commerce, it is generally in large pieces, very tortuous, furrowed both longitudinally and transversely, of a dark brown colour externally, and of a yellowish hue within. The axis is not central. It has no odour; the taste resembles that of Dulcamara, but is more decidedly bitter. There are, however, several varieties to be met with in the shops, the product, in all probability, of other species, or perhaps even of other genera.

*Angræcum fragrans*.—This parasitic plant, belonging to the natural order Orchideæ, is found in the Isle of France, where it is known under the name of Faam. It is also termed Isle of Bourbon tea, and is highly prized for its reputed efficacy in phthisis pulmonalis and disordered digestion. According to DUPETIT THOUARS (*Orchidées d'Afrique*, 54) it is usually given in infusion, this infusion is agreeable to the taste and does not offend the stomach even in large quantities.



It has also been experimented upon in France by M. GIRAUDY, who was highly pleased with its powers in affections of the lungs and spasmodic nervous attacks, (*Revue medicale I.* 56.) Since the publication of his memoir, several accounts of its successful employment have appeared in the French Journals, showing that it ranks high as an antispasmodic.

The leaves, as found in commerce, are reddish, long, narrow, smooth, and have a smell resembling that of Vanilla. Their taste is bitter, somewhat analogous to that of the bitter almond. M. DRIOT has prepared a syrup and pastilles with this article; these have been useful in catarrh; they are made as follows: one part of the leaves are to be infused in six parts of water and distilled, affording four parts of medicated water, in which eight parts of white sugar are to be dissolved. The pastilles are made by forming a paste with the medicated water and sugar and adding  $\frac{1}{8}$  of the extract of the plant.

*Xanthoxylon*.—Four species of this genus are found in the United States; *X. fraxineum*, *X. clava Herculis*, *X. glandulosum* and *X. tricarpum*, all of which appear to possess analogous medical qualities. They are shrubs of ten or twelve feet in height, with pinnate leaves and scattered prickles. Every portion of these shrubs is possessed of active qualities, apparently depending on the presence of a large quantity of volatile oil. The bark, however, is the only officinal portion, this was in general use among our Indian tribes in a variety of complaints, and has also been highly spoken of by many medical practitioners, especially in the West Indies where one or more of the species are also indigeneous.

The bark is a powerful stimulant to the skin, or to mucous surfaces; when chewed it occasions a burning sensation followed by a profuse salivation, and has hence proved useful in certain cases of toothache; this property, however, it enjoys with all other substances which act as irritants to the lining membrane of the mouth; this bark has also proved useful in some cases of paralysis of the tongue. In decoction we have some evidence in its favour in rheumatism, and in those cases

of chronic disease of the stomach, where it becomes necessary to stimulate that organ to assist the digestive process. A peculiar principle has been discovered in it by CHEVALLIER and PELLETAN, which they term Xanthopierite, this principle which appears identical with that detected in the same bark by Dr. STAPLES, and which he calls Xanthoxyline, is closely allied to and perhaps identical with piperine, and like that substance probably owes its active properties to the presence of volatile oil.

R. E. G.

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ART. XXVIII.—PHARMACEUTICAL NOTICES. NO. XV.

*Kermes mineral.* The process of displacement, which has hitherto been thought to be applicable to animal and vegetable substances only, has lately been successfully employed by M. MUSCULUS of Soultz to the preparation of *Kermes mineral*, and the golden sulphuret of antimony. To make the former, he advises: Slacked lime 6 parts; subcarbonate of potash, or soda well dried, 4 parts; sulphuret of antimony in fine powder, 2 parts; flowers of sulphur, 1 part; and dry and clean sand, 8 parts. These substances are to be well mixed and introduced into an apparatus for displacement, made of glass or porcelain, at the lower part of which some fragments of glass are to be placed, and the whole covered with a layer of sand; cold water is then to be poured on the mixture, till the fluid that passes through will not afford a precipitate with hydrochloric acid. The liquid thus obtained is to be treated with hydrochloric acid. The precipitate is to be well washed and dried, and equals in quantity the sulphuret employed. *Kermes mineral* is prepared in the same way, except that the flowers of sulphur is omitted, and the precipitation performed with bicarbonate of soda, or carbonic acid gas.

M. BOULLAY, in noticing this process, says that the golden sulphuret is beautiful, but that the *kermes* is too heavy and of

a dull colour; this he states may be remedied by using dry carbonate of soda, and by diluting the obtained fluid with an equal volume of distilled water, before precipitating.

*Syrup of Asparagus.* Since the introduction of this article into the Materia Medica, many formula have been given for its preparation; among these the following is said to afford good results.

Eight pounds of asparagus are to be cut into small strips or pieces, and subjected to strong pressure; the juice thus obtained is to be evaporated to the consistence of syrup, and the asparagine suffered to crystallize; the uncrystallized portion is then to be decanted and still further evaporated to the consistence of an extract.

The perenchyma of the tops or green portion of the shoots is to be extracted by macerating them for some days in half their weight of alcohol of 23°, after due maceration, the tincture is to be pressed out and used to take up all soluble portions of the above mentioned extract, and then distilled to drive off the alcohol. To the residue the asparagine is to be added and a syrup formed in the usual manner.

*Iodide of Potassium.*—There is scarcely any one of the salts, for the preparation of which so many processes have been devised, as the iodide of potassium. The following, which is recommended by M. BARRUEL, has the advantage, according to M. COTTEREAU, of affording a pure article, whilst at the same time it is economical and readily executed.

It consists in making a solution of caustic potash with one part of the alkali to three of water. To this solution, small portions of iodine purified by sublimation, are to be gradually added, carefully stirring the mixture with a glass rod. The iodine rapidly disappears, and fresh portions are to be added until the solution acquires a somewhat brownish colour indicating a slight excess. When the potash is about half saturated, a white precipitate is formed, owing to the formation of an iodite of potassa, which being less soluble than the iodide is

partly precipitated. In this operation, a part of the potash is decomposed and yields its oxygen to a portion of the iodine, thus forming iodous acid; this latter combines with the undecomposed alkali, forming iodite of potassa. At the same time the potassium arising from the deoxidation of the potassa, combines with another portion of the iodine to form iodide of potassium. This product is evaporated to dryness, and mixed with a sixth part its weight of pure charcoal, and heated in a crucible to a low red heat. The iodide experiences no alteration, but the iodite is decomposed, the oxygen of the acid and base uniting with the carbon to form carbonic acid; whilst the iodine and potassium also combine in the state of an iodide.

When the operation is finished, which may be known, by the mass no longer scintillating on being stirred, the product is to be removed from the crucible, and dropped into about three or four times its weight of distilled water. The iodide is rapidly dissolved, whilst the undecomposed charcoal remains suspended in the fluid. The solution is to be filtered and evaporated in a glass capsule, till a slight pellicle is formed, and then permitted to cool slowly. The crystals thus obtained must be drained, dried in a stove and kept in closely stoppered bottles.

It should always be borne in mind, that to obtain a perfectly pure and colourless iodide, it is absolutely necessary, that during its preparation it should not be exposed to the action of any acid vapour, and more especially chlorine gas, otherwise the iodide will be more or less ioduretted and of a yellowish colour.

*Caustic potassa.* M. COTTEREAU gives the following advice respecting this article. Whenever any of it is removed from the bottle in which it is kept, the mouth of the bottle and the stopper should be washed with a wet sponge, and then carefully wiped dry, for if any particles should adhere to the ground surfaces, it will cause such a union between them as to render it almost impossible to remove the stopper.

R. E. G.

## SELECTED ARTICLES.



ART. XXIX.—ON THE BEBEERU TREE OF BRITISH GUIANA AND SULPHATE OF BEBEERINE. By Sir ANDREW HALLIDAY. K. C. H; F. R. S. E. Deputy-Inspector General of Army Hospitals.

I AM desirous of directing the attention of the profession, to a discovery which I hope will not only prove of consequence as a valuable addition to our list of important remedies, but which may become of some consideration to this country as an article of commerce.

HUGH RODIE, Esq, a Surgeon in the Navy, was, like many others in his situation placed on the half pay list at the end of the last war, and having relations in, or connected with, the colony of British Guiana, he fixed himself in the latter end of 1814 at Demerara, as a general practitioner in medicine. Mr. RODIE, I have reason to know, was and is an excellent chemist, and was altogether much attached to the study of natural history, so much so, indeed, that, although he very soon obtained a most extensive and lucrative practice he preferred the solitude of the woods, where he could study nature at his leisure, to watching the progress of disease in the chambers of the sick at Demerara. He obtained a grant of land in the interior of the country, and some years ago commenced wood cutter.

In a communication which he made to me last winter, he states that, soon after he settled in British Guiana, the French government sent a deputation of royal academicians to the colony of Cayenne, to discover the Jesuit's bark, or a substitute for it; and it was currently reported that they had suc-

ceeded. But that he, considering that he was nearly in the same parallel of latitude in which that valuable tree is found, and seeing that the sulphate of quinine, which was then selling at 18s. per drachm, was frequently adulterated, and estimating, too, the importance of that medicine, without which our fleets and armies could not exist within the tropics, he turned his whole attention towards the discovery of the cinchonas in the wide spreading forests that surrounded him.

"After many fruitless trials, I discovered in the bark of a magnificent variety of the laurel, abounding in the interior forests in this country, and called by the native Indians *Bebeeru*, all the sensible qualities of the cinchonas. I therefore subjected it to analysis, and found that it also possessed the chemical properties of the officinal bark, with only some slight shades of difference, and particularly in its habits with the acids. A concentrated solution of what I would beg leave to call the Sulphate of Bebeerine, was prepared and first exhibited in intermittent fever, and it was found to possess the medical qualities of quinine in a very eminent degree. It seemed, however, to be more directly febrifuge, and to act rather as what is understood by a specific, than by exciting a counter morbid action in the system, which it is well known the exhibition of quinine in tropical fevers very frequently produces. The trials that have hitherto been made of the sulphate of bebeerine have been very limited, but they have been very successful. I tried it in many cases of intermittent and remittent fever, and found it equally efficacious with sulphate of quinine; nay it frequently cured the fever when quinine failed. I have communications from many eminent practitioners in the West Indies, and they all assure me that they have found the sulphate of bebeerine as valuable a remedy, if not more so, as the sulphate of quinine; and that it had never produced any irritation of the stomach, nor that alarming symptom of deafness and determination to the head which so frequently follows the exhibition of quinine in large doses."

I was further informed that from the want of a suitable apparatus, Mr. RODIE had only been able to prepare a very

limited quantity of his concentrated solution, and he could send only a very small supply at the time I applied to him; but when the value of this remedy has become more generally known, it will gradually find its way into practice; and the bark prepared and packed in Guiana should be sent home, in order to have the bebeerine manufactured properly, and in sufficient quantity in our laboratories. At present the tree is only felled for the value of the timber, and thousands of tons of the bark are annually destroyed.

Mr. RODIE found so much difficulty in crystallizing the sulphate of bebeerine, that he has hitherto prepared it for use in solution with a little excess of acid; and twenty minims of this solution is a sufficient dose. It has now been pretty generally distributed throughout the West Indian colonies, and before I left Demarara, I sent to Sir JAMES M'GREGOR, a small box of what was delivered to me, which he has kindly said he will distribute to the different stations of our army, in order to ascertain its effects.

I am convinced that, as a febrifuge, it is far superior to any we as yet possess, and with regard to what has already been proved with the ordinary barks, we find that quinine is more powerful as a febrifuge than cinchonine, in the proportion in which it is less easily crystallized, so bebeerine as being still less crystallizable than quinine, is found to be more efficacious as a remedy in febrile diseases.

*Edinburg Med. and Surg. Journ.*

## ART. XXX.—ON KINOVIC BITTER. By L. A. BUCHNER, Jr.

I RECEIVED from Dr. WINCKLER of Zwingenberg, some of the kinovic bitter lately discovered by him, with a request that I would make an elementary analysis of it. This I have been glad to undertake on many accounts, and proceed to state the results of my experiments, with a short prefatory synopsis of Dr. WINCKLER's researches.

This learned chemist, having commenced a series of pharmacological experiments on the cinchonas, repeated the numerous chemical investigations of other experimenters, and added many new and important observations. Thus, in his experiments on *crown bark*, he found by treating this bark with ether, and dissolving the product in alcohol, that it contained another crystalline substance besides quinia. This new substance had a much more bitter taste than even quinia, and was endowed with widely different properties. He afterwards discovered the same substance in the *new bark*, (*quina nova*) the origin of which is almost unknown to us, but which can be readily distinguished from the true barks by its want of action on tartar emetic and on tincture of galls.\* This bark had already been analyzed by MM. PELLETIER and CAVENTOU, who discovered a peculiar acid in it, the kinovic, which was also obtained by Mr. WINCKLER, but the bitter principle above alluded to, which is called by the discoverer, kinovic bitter, appears to have escaped them.

It may be procured by several modes, either by exhausting the bark by alcohol, heating the alcoholic extract with water to remove the kinovic acid, redissolving the residue in alco-

\* All that is known respecting it, is, that it comes from Surinam, whence it has been termed *quina nova Surinamensis*; HAYNE and VON BERGEN are of opinion that it is afforded by the *C. oblongifolia*; MARTIUS supposes that it is furnished by the *Portlandia grandiflora*, while GEIGER thinks it probable that it is the product of the *Exostemma angustifolia*.



hol, adding gelatine to the solution to precipitate the tannin, and evaporating; or by mixing the alcoholic extract with animal charcoal, digesting with ether and evaporating the ethereal tincture. But the simplest and best plan is to exhaust the bark by means of ether, to evaporate the tincture, digest the residuum with alcohol, decolourize this solution by means of animal charcoal, and to add very diluted liquid ammonia, which precipitates the bitter principle of a white colour, and removes any traces of the kinovic acid.

If kinovic bitter be subjected to dry distillation, it melts and assumes a yellowish colour; at a higher temperature there is an extrication of thick white fumes, and it becomes brown and at last is carbonized. The product consists of a slightly yellow acid liquid, containing acetic acid, and of a somewhat thick, bright brown oil, of an empyreumatic but not disagreeable smell, and an acrid, camphorated taste. The aqueous fluid when saturated with caustic potash, gives no signs of the presence of ammonia.

The kinovic bitter, triturated with quick-lime and a little water, and heated in a retort, affords a transparent liquid and an oil of a greenish yellow colour, and a penetrating smell, resembling that of peppermint, and identical with that produced by the distillation of camphoric acid and quick-lime. The product of this distillation is neutral, and gives no trace of ammonia on the addition of caustic potash. Hence kinovic acid contains no azote.

To determine its chemical composition, it was first dried at a temperature of  $120^{\circ}$  and then burned in the apparatus of LEIBIG, with oxide of copper; I obtained the following results:

	<i>Kinovic bitter.</i>	<i>Water.</i>	<i>Carbonic acid.</i>
I.	0.20 grammes,	0.151	0.450
II.	0.25	0.198	0.567
III.	0.30	0.234	0.680
IV.	0.30	0.228	0.676

Which gives:

	I.	II.	III.	IV.
Carbon,	62.22	62.71	63.04	62.30
Hydrogen	8.39	8.80	8.66	8.44

The mean of these analyses gives:

Carbon	62.56
Hydrogen	8.57
Oxygen	28.87

On comparing this composition with that of other organic bodies, I found that the kinovic bitter was identically constituted with the bitter principle of Sarsaparilla. As the kinovic bitter, like salseparine, forms unstable compounds with other bodies, it is impossible to ascertain its atomic composition with certainty, and it is therefore only by an exact comparison of their physical and chemical properties that we can decide whether they are isomeric or perfectly identical. Such a comparison was the more easy, from the full investigation of salseparine by MM. POGGIALE and THUBEUF.

M. POGGIALE found that salseparine contained 8.56 water of crystallization. To determine the quantity of this fluid in the kinovic bitter, I first deprived this of its hygroscopic water in a glass tube, by means of the small pneumatic apparatus of GAY LUSSAC, then weighed it, and exposed it to a heat of 120° till it ceased losing weight.

I.	0.22 grains lost	0.018
II.	0.30	0.026
III.	0.40	0.035

Hence, 100 parts of the hydrate of kinovic bitter contain

	I.	II.	III.	Mean.
Kinovic bitter	91.82	91.34	91.25	91.47
Water	8.18	8.66	8.75	8.53

M. POGGIALE gives as the formula of salseparine:  $C^8 H^{15} O^3$  and for the hydrate of the same  $+IAq$ . As I have no

data for making the least correction of an analysis made with great care of a very pure preparation, I prefer the following formula for the kinovic bitter and salseparine, founded on calculation.

<i>Atoms.</i>		<i>By calculation.</i>
Carbon	17 = 1299.429	62.46
Hydrogen	29 = 180.960	8.69
Oxygen	6 = 600.000	28.85
	<hr/> 2080.389	<hr/> 100.00

The formula of the hydrate is therefore  $C^7 H^{29} O^6 + 2 (H^2 O)$ .

Kinovic bitter is white and pulverulent, but may also be obtained in small scales, when its alcoholic solution is slowly evaporated. It is inodorous, though when heated it diffuses a faint balsamic odour; its taste is farinaceous, but its after taste is somewhat acrid, bitter and very disagreeable. It is scarcely soluble in cold water, but more so in hot; soluble in almost all proportions in strong alcohol, less so in ether or the oils. Exposed to the flame of a spirit lamp, or a slip of platina, it first melts into a yellowish fluid, which on cooling assumes the appearance of a resinous mass; at a higher temperature it becomes brown and gives out white fumes and a resinous odour, leaving a very light charcoal, which burns readily and without residue.

All these properties are perfectly similar to those of salseparine as described by MM. POGGIALE and THUBEUF.

The aqueous and alcoholic solutions of salseparine froth much on being stirred. The same takes place with those of kinovic bitter, even where they are much diluted. According to M. POGGIALE, salseparine slightly changes the colour of tincture of turmeric as well as that of syrup of violets, and consequently is somewhat alkaline. I dissolved kinovic bitter in diluted tincture of litmus, slightly reddened by an acid, and also in the tincture of turmeric, but could not perceive the least change of colour. My experiments therefore confirm those of M. THUBEUF on salseparine.

A solution of caustic potash as well as that of soda, according to M. POGGIALE will dissolve salseparine by the aid of heat. Ammonia has the same effect; hence when it is precipitated by this alkali, care must be taken to avoid an excess of the latter.

From my experiments, kinovic bitter acts in precisely the same way. Caustic ammonia dissolves a small quantity, giving rise to a yellowish opaline liquid, which is perfectly transparent when hot, but becomes milky on cooling, and which, when saturated with acetic acid, lets fall a precipitate of kinovic bitter in large white flakes. Solutions of caustic potash or soda poured on this substance also become of a yellowish green colour, and form a gummy mass, which afterwards dissolves into an opaline liquid, and acts like the ammoniacal solution on cooling and the addition of acid.

The action of concentrated sulphuric and nitric acids on salseparine is interesting. They produce with this substance, various beautiful changes of colour without altering it much. Thus, according to M. POGGIALE, if concentrated sulphuric acid be poured, drop by drop, on salseparine, this latter first assumes a deep red colour, which gradually changes to a violet and finally to a pale yellow. A solution of salseparine in sulphuric acid is thus obtained, which when diluted with cold water, precipitates the salseparine without alteration, and the yellow colour of the liquid disappears.

The action of nitric acid on this substance is a little different from the above. It dissolves it at ordinary temperatures, but acts on a small portion and becomes yellow. This solution assumes a milky appearance on the addition of water, and the precipitate that forms is almost entirely composed of unaltered salseparine.

I gradually added concentrated sulphuric acid to dry kinovic bitter and found all the above mentioned changes of colour occurred. This substance first became brownish, then of a deep blood red, afterwards of a beautiful blueish red, which finally faded; on the addition of water I found that the precipitation of all the unaltered kinovic bitter depended much

upon the time. If we wait till the red liquid begins to lose its colour, the precipitate is not completely white, it also has very little bitter taste and consists, for the most part, of altered kinovic bitter. But if the solution be diluted with water when it assumes the violet tint, the kinovic bitter is precipitated of a white colour, and almost without alteration.

Concentrated nitric acid acts with this substance precisely as it does with salseparine; it dissolves it, giving rise to a brownish liquid. The addition of water causes a yellowish white precipitate formed principally of unaltered kinovic bitter. There is no formation of oxalic acid.

As to the action of the preceding acids in a diluted state, as well as that of hydrochloric, acetic, &c., they all dissolve more or less of this substance with the assistance of heat, and on being carefully concentrated, deposit it in different forms according to the nature of the acid employed. The solution in hydrochloric acid affords the finest crystals; these are small prisms, having a silky lustre. If these solutions are neutralized with ammonia or any other alkali, the greater part of the kinovic bitter is precipitated in the form of a white powder.

The same phenomenon takes place with salseparine, and we cannot believe, as has already been remarked by M. POGGIALE, and as I have satisfied myself by numerous experiments, that a true chemical combination takes place between the acid and the bitter principle; if this latter is precipitated on the addition of an alkali, it is only because the salt combines with the acid which holds the bitter principle in solution, whilst it is almost insoluble in the alkaline solution. Both salseparine and kinovic bitter retain a small portion of acid in crystallizing from one of these solutions, which might lead to the supposition that a chemical combination really takes place. But if these crystals be redissolved in water or alcohol, or well washed, all the acid disappears.

I trust that I have shown that kinovic bitter has not only the same composition as salseparine, but also that these two substances are identical in all their properties, and are consequently one and the same body. But, it is evident, on the

other hand, that kinovic bitter has no relation with the alkaloïds of cinchona, though we are, on this account, by no means authorized to conclude that the *quina nova* is not a true bark, for the quina regia, on whose origin there is no doubt, also contains the same principle. It is not the only instance of the same substance being found not only in different genera, but also in different families. I need only instance the existence of saponine, emetine, asparagine, &c. in widely separated plants.

*Journ. de Pharm.*

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ART. XXXI.—REPORT TO THE SOCIETY OF PHARMACY OF PARIS ON A MEMOIR BY M. ANDRE ON THE ACTION OF ACIDS ON QUINIA. By MM. SOUBEIRAN and O. HENRY.

IN the month of August, 1835, M. J. J. Andre, professor in the military Hospital of Instruction at Metz, addressed a memoir to you, which was referred to M. Soubeiran and myself. To fulfil the task assigned to us, we shall detail the experiments of M. Andre and make our observations on them. We shall do this somewhat at length. M. Andre has proposed to explain the action of the acids and chlorine on quinia, and deduced applications of importance in the analysis of barks, and finally has produced iodide of azote, by a reaction not hitherto noticed.

1. *Action of acids on Quinia.* “All those who have prepared solutions of sulphate of quinia by the aid of a few drops of sulphuric acid, must have remarked the beautiful opaline and blueish tint that the solution assumes; the best chemical works do not notice this fact. M. Guibourt, is, I believe, the only person that has attempted to explain. He says, (*Pharmacopée raisonnée t. I.*) ‘The syrup of quinia, as well as all solutions of sulphate of quinia, when diluted with

water present an opaline and blueish colour. This is owing to the affinity of the water for the acid causing a partial precipitation of the subsulphate, and permitting the molecules of the salt to acquire a degree of cohesion, and at the same time of tenuity, capable of producing a blueish colour.' "

M. Andre does not admit this explanation to be satisfactory, and we are of the same opinion, because, in the first place, this opaline appearance takes place, not only with sulphuric acid, but also in different degrees with almost all the other acids; next, because it manifests itself in a quantity of fluid more than sufficient to dissolve the subsulphate itself if thus produced; and finally, because the aqueous solution of the subsulphate, as is stated by M. Andre, though perfectly clear in ordinary lights, also presents a blueish opaline reflection by reflected light. "Besides which, how does the sulphuric acid act on a solution of sulphate of quinia? According to the received opinion, the acid renders the salt neutral and afterwards acid; but with 0.1 of subsulphate and 75 grains of water at  $+60^{\circ}$  F. a colourless solution is obtained, and the sulphuric acid that is added, which ought to augment the solubility of the salt, if it was not already complete, appears on the contrary to diminish it, as the blueish tint which is manifested, is certainly owing to a precipitate so finely divided as to remain in suspension. It is known, however, that sulphuric acid facilitates the solution of subsulphate of quinia, for the crystallized bisulphate is evidently the most soluble; finally, how are these apparently contradictory effects to be explained, resulting as they also do from the action of other acids on the alkaloid, which do not alter its composition."

M. Andre endeavours to explain these facts, by considering the quinia to be a sort of resinate of ammonia. He is of opinion: "That the first additions of acid tend to saturate a portion of the ammonia only, and that the resin still retaining enough of the base to be soluble, the fluid remains clear, as in the case of the subsulphate. But when the acid becomes predominant, it is an indication that all the ammonia has entered into a new combination, whilst the resin in a free state re-

mains in an infinitely divided state suspended in the liquid, and communicates a blueish colour to it. If, to this solution ammonia be very gradually added till saturation, the fluid again becomes colourless, because the resin is again re-dissolved."

"Nothing is easier than to demonstrate how the sulphuric or any other acid, facilitates the solution of the subsulphate. The concentrated acids alter the composition of resins, especially when aided by heat, and convert them into artificial tannin, but, when they are diluted they dissolve it without alteration. Nevertheless, as is the case in the acid solutions of quinia, the solution is not complete; the molecules are simply in a state of great division."

"Some bodies having a great affinity for hydrogen or oxygen and chlorine appear to dissolve this resinate of ammonia in a more marked manner; but it appears that in such case, the constitution of the alkaloid has undergone more or less change, and that it is really modified."

This explanation, ingenious as it is, does not appear to us to be exempt from objections, and M. Andre himself admits this, for he says, "I am far from asserting that my opinion is not liable to objections, it is not even new; but my object, in this paper, has been rather to attract the attention of more experienced chemists to these difficult points, than to attempt an explanation of them."

In fact, in the above explanation, we cannot see, why, if the acids and ammonia dissolve this electro-negative resin so readily, a resin allied to those so thoroughly examined by M. Unwerdorben, and which performs the part of an acid as regards ammonia or its elements; why, when the proportions of acid and ammonia predominate, there is not a complete solution, in fact, either the fluid is opaline and blueish, or there is a precipitation of white flakes. Moreover, if quinia is a kind of salt, with a base of ammonia, why, when it is heated with acids or alkaline oxides, is there not a formation of an ammoniacal salt or a disengagement of ammonia.

Although this view of quinia as a species of resinate of am-



monia, may be erroneous; and even the opinion of M. Dumas, which considers it as well as other organic alkaloids as *basic amide* (amides basiques) may be thought doubtful, since hitherto the vegetable alkalies have not presented the reactions of the *amides* with acids, alkaline oxides and water. At the same time it is true that the composition of quinia and all the organic bases render these hypotheses probable.

It is generally agreed at the present day that these compounds exist in a formed state, and it has been ascertained that their alkalinity is not dependent on the presence of the alkaline oxides employed in their extraction; but it may be supposed that they have all a common radical, of which azote forms part, whether this radical is represented by the elements of ammonia, or by those of an amide, is yet undetermined. M. Liebig has shown that each atom of an organic alkali contains the same number of atoms of azote; that, moreover, the law of composition of salts of these bases follows that of the ammoniacal salts, and although he does not consider the electro-positive radical as formed by ammonia, we cannot avoid perceiving its close approximation.

*Action of chlorine on quinia.* M. Andre in subjecting quinia or one of its salts to the action of chlorine, thought that he remarked a peculiar alteration, not perceptible with the other vegetable alkalies, and which serve to characterize this organic base. He has seen quinia, when thus treated, present marked and characteristic phenomena.

“When a small quantity of liquid chlorine is added to an aqueous solution of quinia, or of one of its salts, except the sulphite, the solution becomes of a light brown colour; if an excess of acid is present, and consequently the fluid has a blueish colour, this is destroyed. The chlorine first combines with ammonia united to the resin, and this becoming freed and in suspension in the liquid, this latter assumes a feeble blue tinge; but, on adding an excess of chlorine, this dissolves the suspended resin, and the colour disappears or rather changes to a yellowish hue. Having wished to precipitate

the resin which I supposed to have been acted upon by the chlorine, by means of weak ammonia, I obtained a green precipitate, which was immediately re-dissolved by the liquid and communicated to it a rich emerald green colour. If the solution of quinia, thus treated with chlorine be somewhat concentrated, the precipitate is of a dull tint; sometimes the quinia becomes agglomerated and floats on the surface in small masses, resembling green wax, and which like that substance are very ductile.

“The emerald green liquid contains an excess of ammonia; it can be rendered neutral, by adding with great precaution, very small portions of acid, the fluid then becomes of a sky blue colour. If too much be added at once, the solution becomes of a violet or even a fire red hue.” This sometimes lasts, says the author, for several days, but fades, and a flocculent precipitate occurs.

These alterations are worthy of particular attention, and it appears to us, by collecting all the products and subjecting them to rigorous elementary analysis, that we may arrive at a knowledge of the true arrangement of the atoms of quinia and consequently of vegetable alkalies of the same class.

M. Andre has not studied these alterations of quinia, but he has observed that the green, blue or violet tints are not produced in the same manner, when ammonia is added before the chlorine, &c. He adds that cinchonia, morphia, strychnia and brucia and their salts did not undergo these changes, on the addition of chlorine, ammonia and an acid. Cinchonia afforded a brown colour, morphia a fire red, and the two others white precipitates.

Experience has demonstrated to us the truth of these results. We will merely observe that to succeed, the solutions of the alkaloids must be very much diluted, and the ammonia must be very carefully added, and then the acid, both of them having been previously much diluted.

*With quinia.*—The addition of ammonia in chlorine liquid, gives an emerald green tinge, which disappears with acids, but re-appears when an additional portion of ammonia is added;

the blue shade only occurs when the acid is very much diluted and added drop by drop.

*With Cinchonia.*—The tint obtained is of a somewhat orange red, and in twelve hours there is a brownish precipitate.

*With Morphia.*—On pouring chlorine into a diluted solution of a salt of morphia, this solution soon becomes of a somewhat orange yellow; ammonia gives a greater intensity to it, and the cautious addition of an acid only renders it lighter, but does not destroy it.

*With Narcotina.*—This base is not acted upon by these modes of reaction.

*With Strychnia.*—The saline solution on the addition of chlorine, becomes of a milky white; ammonia causes a precipitate which gradually disappears, and the liquid also remains milky on the cautious addition of an acid.

*With Brucia.*—This base affords the same results.

Thus we have some new characteristics of the vegetable alkalies in addition to those already known, which may serve to distinguish these substances from each other, when dissolved in alcohol or ether, besides the differences of their crystallization, their physical properties, their solubility, their action on the animal economy, &c. &c.

The different colours produced by re-agents on the above alkalies are:

1. *Quinia*, dissolved in the saline state, treated with liquid chlorine, and then with ammonia in slight excess, assumes a beautiful emerald green colour, which changes to white or violet on being saturated with a diluted acid.

2. *Cinchonia*, under the same treatment, becomes of a reddish and somewhat orange colour.

3. *Strychnia* becomes of a milky white.

4. *Morphia*, when treated with the muriate of the peroxide of iron, assumes a beautiful blue colour.

5. *Veratria*, treated with sulphuric acid becomes of a rich violet red.

6. *Brucia*, treated with protochloride of tin assumes a violet tint of various degrees of intensity.

III. *Application of the preceding facts to the analysis of Peruvian barks.*—M. Andre proposes to apply the above facts to the analysis of barks, and considers his results as more exact than any means hitherto suggested. He pursues the following method; he takes the product of an acid decoction of quinia, after having been cooled and filtered, then left in contact with animal black, till it has been decolourized; when the red tint has disappeared, he states that a blueish zone is discoverable on the surface of the clear fluid, and which is visible he says as long as 0 gr. 00006 of the alkaloid is present; he also treats the acid decoction with chlorine and ammonia, and thus obtains more or less distinct green tints; another indication of the presence of quinia. This plan does not appear to us as certain a test as the author supposes. In the first place, the opaline blueish colour is not peculiar to quinia alone, although this alkaloid possesses the property of exhibiting it in the highest degree; solutions of sulphate of morphia, sulphate of cinchonia, strychnia, &c. also present it; moreover in the filtration of the acid decoction and its decolourization by animal charcoal, a large proportion of the quinia remains with the insoluble colouring matter and with the animal black, so that a trial of the clear liquid only gives a *qualitative* valuation, but not a *quantitative*. Besides which, how would it be possible to determine the proportion of quinia present by the intensity of the blue reflection, or of the green colour? We believe this to be almost impossible, and hence that the plan of M. André is not a good one.

IV. *Action of ammonia on a mixture of iodic and hydrochloric acids.*—"While endeavouring to separate the quinia altered by the action of the chlorine and ammonia, I thought of the liquid chloride of iodine, spoken of by Serullas, as a mode of separating alkaloids from their alcoholic solutions; I imagined that the iodic acid which might be formed in the liquid perchloride would combine with the altered quinia, and form a stable and almost insoluble iodate, whilst, the hydrochloric acid, would unite to the ammonia. With these

views, I added this perchloride to a solution of quinia containing chlorine and ammonia, but was greatly astonished at obtaining only a brown black precipitate, which on examination proved to be fulminating *iodide of azote*."

M. Serullas advised the use of subchloride of iodine and ammonia to prepare this iodide, and much the same result might be expected from the perchloride, although the resulting iodide may differ somewhat in its composition. M. Andre has moreover, found that treating some crystals of pure iodic acid with hydrochloric acid, and pouring into the yellowish fluid a slight excess of ammonia at 22° there was a precipitate of a certain quantity of iodide of azote. We have verified this, and also found that it takes place with the iodate of potassa.

*Journ. de Pharm.*

#### ART. XXXII.—FACTS IN RELATION TO ETHER.

BY J. LIEBIG.

SOME time since, Liebig was led, from the results of his analysis of the phosphovinate of barytes, to regard the acid of this salt as a combination of phosphoric acid and ether. A similar composition must in this case be attributed to the sulphovinates, but experiments made on this subject, have only shown, that by the aid of heat, these salts can be deprived of a portion of their water, but without being decomposed. The question rested here, when M. Marchand ascertained that the sulphovinates lost their water with great facility in vacuo, at the ordinary temperature by the aid of sulphuric acid. It results from his experiments that the sulphovinates of lime, barytes and soda, may be represented by the following formula:  $2 \text{ So.}^3 \text{ 3} + \text{Ba. O. (Ca. O. Na. O.)} + \text{E. O.} + 2 \text{ Aq.}$

And that if the two atoms of water be removed by means of an air pump, a salt will be obtained, composed of 2 atoms

of sulphuric acid, 1 atom of base and 1 atom of ether. The sulphovinate of potash contains no water of crystallization.

M. Liebig repeated the experiments of M. Marchand, and has confirmed his results in the most satisfactory manner. But he does not admit the doubt entertained by this chemist, as to the formation of alcohol in the distillation of sulphovinate of barytes with quick-lime. This formation, which is noticed by Mitscherlich, really takes place, and there is also a production of oil of wine and of the combined hydrogen of Serullas. In fact, if sulphovinate of potash be mixed with hydrate of lime, and it be subjected to heat not exceeding  $400^{\circ}$ , spirit of wine only is obtained and the mixture is not blackened; if quick-lime be used instead of the slacked lime, a liquid is afforded on distillation, which when mixed with water, gives a precipitate of the sulphate of the oil of wine; and if, at the commencement a high temperature be used, the mixture becomes black, and there is a production of olefiant gas, as well as of spirit of wine and the sulphate of the oil of wine.

The formation of the spirit of wine is readily explained by the composition of the sulphate of the oil of wine: this body is formed of 2 atoms of sulphuric acid and  $8 \text{ C.} + 18 \text{ H.} + \text{O}$ ; by adding one atom of spirit of wine;  $4 \text{ C.} + 12 \text{ H.} + 2 \text{ O}$ . the result is  $12 \text{ C.} + 30 \text{ H.} + 3 \text{ O}$ ; that is, 3 atoms of ether.

M. Liebig also cites the two following experiments, which are remarkable for their elegance.

If a mixture of five parts of crystallized sulphovinate of lime and one part of acetic acid be distilled by a gentle heat, a large proportion of absolutely pure acetic ether will be obtained.

By distilling five parts of sulphovinate of potash and five parts of sulphuric acid diluted with one part of water, perfectly pure ether will be afforded. Equally pure acetic ether can also be produced, by heating concentrated phosphovinic acid with acetate of potash.

*Journ. de Pharm.*

## ART. XXXIII.—ON THE PREPARATION OF DISTILLED WATERS. By E. SOUBEIRAN.

OBSERVATION having shown that certain distilled waters made by exposing the plants to steam, were of a superior quality than if the plants were mixed with water and distilled in the usual way, I was anxious to ascertain if this was as generally the case as was supposed, and for this purpose made comparative trials of a number of plants by both modes of operating. I also examined under what circumstances dried plants could be used instead of the fresh.

With these views I took a certain quantity of each plant and divided it into four equal parts; two were distilled in the first state, one of them by vapour, the other in the ordinary manner; the two remaining parts were dried and then subjected to the two modes of distillation. I found, generally speaking, that the products of dried plants were evidently of inferior quality.

For the sake of brevity, I shall indicate the relation of the plant to the product thus 1 : 1, this signifies that the weight of the distilled water obtained, equalled that of the plant used; 1 : 2, that double the weight of product was obtained, &c; the first cipher always referring to the article acted upon and the second to the product.

*Wormwood*, 1 : 2. The product was collected in two portions, each of which had a stratum of oil on the surface; the product by vapour was the best.

*Bitter almonds*, 1 : 2. The powder should be macerated in cold water for twelve or fifteen hours before distillation, for by this means, as has been stated by M. Geiger, the proportion of oil obtained is much larger.

*Anise*, (dry seeds.) 1 : 5. The fifth and last product was still oily, by both modes of operating; the product by steam the best.

*Mugwort*, 1 : 2. Product by vapour the best.

*Elecampane*, (dried root) 1 : 4. The product by both modes contained helenine which separated on standing; the product by the naked fire gave the largest product, as well as the most odorous. The difference, however, was slight.

*Blue bottle*, 1 : 1. Product by vapour was limpid, that by the naked fire contained white flakes, and had rather the most taste.

*Borage*, 1 : 1. After a lapse of three months, the product by naked fire was spoiled, and I could not make a comparison.

*Holy thistle*, 1 : 1. A small quantity of a concrete, white, volatile oil was separated by each process. There did not appear any difference in the products, though that by steam kept the best.

*Scurvy grass*, 1 : 2. The first product by naked fire was equal in weight to the plant; was milky and very sapid; the same with the second; the third had less taste, and the fourth scarcely any. By steam it was transparent throughout, and the third product had very little taste. I repeated this experiment several times, and always obtained a better product by the naked fire. Besides the acrid oil that pre-exists in the first plant, can there be a production of an additional quantity by action of cold water; the formation of which is prevented by the action of steam?

*Cress*, 1 : 2. The same as above except that the product is not so strong.

*Fennel*, 1 : 2. I obtained the best product from the dried plant, but I am doubtful of this result, as I only made the experiment once.

*Fennel*, (dry seeds) 1 : 4. The fourth product by both operations was still charged with oil; the product by steam was the best, but at the same time, it was not as agreeable as that made from the leaves.

*Juniper*, 1 : 2. I obtained the most essential oil by steam; but the odour of both products was so powerful that it was impossible to ascertain which was the best.

*Hyssop*, 1 : 2. I could not appreciate the difference between



the two products. That by naked fire contained the most essential oil. The same was the case when the dried plant was used.

*Lettuce*, 1 : 1. The product by naked fire was more odorous than that by steam. The dried plant afforded a less sapid and odorous product than the first.

*Lavender*, 1 : 2. I could not observe any marked difference between the products of the distillation of the fresh and dried plants; nor did I discover any superiority in that by steam, over that by naked fire. In general, plants that contain a large proportion of essential oil afford products, which it is difficult to compare with any exactness.

*Ground ivy*, 1 : 2. The dried plant afforded the most agreeable product. I could not discover any difference between that made by steam or by naked fire.

*Melilot*, 1 : 2. The product of the dried plant was the most agreeable; a small quantity of white stearoptene separated, but was most abundant in the product by naked fire; the two distilled waters, however, did not present any appreciable difference as to odour.

*Balm*, 1 : 1. In both products, there was a supernatant solid essential oil; but there was no doubt of the great superiority of that prepared by steam.

*Mustard*, 1 : 16. This article cannot be operated upon by steam; and as has been observed by MM. Hesse and Faure, it is most advantageous to mix the flour with cold water and to macerate for some time previous to distillation.

*Orange flowers*, 1 : 2. I have not observed any difference in the quantity of neroli produced by the two processes. The product by steam was the most agreeable.

*Horse radish*, 1 : 4. I distilled two pounds and a half of the fresh root, cut small and bruised, with a sufficient quantity of water. By naked fire I obtained a first product, very milky, after which it became weaker, though the last quantity was still milky and sapid. I repeated the experiment with steam, the fourth product was transparent and tasteless. In another experiment I found the second pro-

duct by steam, stronger than the second by naked fire; this might have depended on a difference in the state of division of the root but at the same time I am convinced that distillation by a naked fire gives the best result.

*Roses*, 1 : 1. The product by steam was infinitely superior to that by the other mode.

*Sage*, 1 : 2. This gave a less quantity of essence by naked fire, and although the two products were very similar, that by steam was the best.

*Elder flowers*, 1 : 1. Preference is usually given to the product from the dried flowers; but on a comparison between this and the distilled water from the fresh plant, there appears no reason for it, except custom.

*Tansy*, 1 : 2. The odour of the tansy is so powerful, that it was impossible to discover any difference between the products of the two processes.

*Thyme*, 1 : 2. The product by steam was the best.

*Linden*, 1 : 1. The water prepared from fresh flowers was the most odorous.

*Valerian*, 1 : 4. Valerian distilled by steam afforded an excellent product; this root like all other dry and hard substances should be broken small, moistened with half its weight of cold water, and not distilled for twelve hours afterwards.

On comparing the results obtained, it will be found that distillation by steam is preferable in a majority of cases, as with

Wormwood	Ground ivy
Aniseed	Melilot
Mugwort	Balm
Elecampane	Orange flowers
Blue bottle	Roses
Borage	Sage
Honeysuckle	Elder flowers
Holy thistle	Tansey
Fennel seed	Thyme
Juniper	Linden flowers
Hyssop	Valerian
Lavender	

Distillation in the old way gave the best results with

Bitter almonds	Lettuce
Scurvy grass	Mustard
Cress	Horse radish

Dried plants rarely merit the preference over fresh, but with the following the product was superior from the dried.

Fennel	Elder flowers
Ground ivy	Linden flowers
Melilot	

The advantage of distilling by steam is especially perceptible in plants having a mild but agreeable smell. When distilled waters are almost inodorous, or on the contrary when they have a very powerful odour, it is almost impossible to appreciate the difference between the quality of the products. I have included such in the list of those which should be distilled by steam, because this method has other advantages; it affords products which keep better; and which can be used at once, as they have not the empyreumatic taste so perceptible in those prepared by naked fire.

*Bull. gen de Therap.*

#### ART. XXXIV.—ON LIXIVIATION OF VEGETABLE AND ANIMAL SUBSTANCES. BY M. SOUBEIRAN.

LIXIVIATION is an operation employed with advantage in the arts, when it is wished to dissolve saline or other substances mixed in small proportion, with masses of insoluble and inert matters; in such case, no other plan can replace it with advantage, for the mass being in thick layers, the first stratum of water which penetrates them dissolves any saline substance it may meet with, then, forced downwards by the succeeding strata of fluid, it gradually arrives at the bottom of the vessel in a state of comparative concentration. If any doubts existed as to the fact of the displacement of one stratum of fluid by an-

other, they would be removed by the experiment of M. Vauquelin, on the displacement of simple water mixed with sand by salt water poured on the surface of this latter. In practice, the advantages premised by theory are not always realized, because the materials cannot be invariably in a proper state of division; because they may be packed or pressed unequally, thus permitting the fluid to escape through some parts with too much rapidity; finally, because the different strata of fluid mix with each other.

Lixiviation was not applied to pharmaceutic preparations, or rather this application was almost forgotten, when MM. Boullay pointed out the advantages of it. They gave it the name of displacement, because strata of the same fluid mutually displaced each other, or one fluid displaced another. It is true M. Payen had advised this process, and M. Robiquet had employed it in certain chemical investigations, but its real application to pharmaceutic preparations appears to be owing to MM. Boullay. Displacement is therefore lixiviation employed on animal and vegetable substances, and affords results in most cases, more consonant to the theory, than processes in the arts, on account of the circumstances being more favourable; the powders employed are better prepared, and greater care is used in the process.

MM. Boullay have generalized this method of displacement, but they have published but few facts with regard to it; M. Simonin applied it to the treatment of ratanhia and sarsaparilla; W. Dublanc used it to prepare the extract of pomegranate root. The most important information on the subject is that published by M. Guillermond, jr. It is not that M. Guillermond applied the process to a great number of different substances, but he was the first to make experiments on the advantages it possessed over other methods of extraction, especially over one long since proposed by Cadet Gassicourt, and which in some cases still merits the preference; this consists of moistening the powder with double its weight of water, and subjecting it to pressure after a few hours of maceration. M. Guillermond has also studied in a very satisfactory manner

the influence exercised on the results, by the mixture of the different strata of fluid, and has arrived at a conclusion differing widely from that of MM. Boullay, for he has found that these strata readily mix with each other. After M. Guillermond finished his researches, I continued them on other substances, and I found, as he had done, that a certain number of bodies were not suited to this process. Called off from the subject by other occupations, I have since again taken it up, and the results of numerous experiments have led me to a modification of my previous opinions. I had already operated on a great variety of substances when I became acquainted with an unpublished memoir by M. Dausse on the same subject. M. Dausse subjected to lixiviation, both with water and alcohol, near eighty different bodies; my experiments were on sixty of these, and on eleven not noticed by him. The result has been a mass of facts which permit a more exact appreciation of this mode of operating.

The best apparatus that can be used is that described by MM. Boullay; it consists of a cylinder of tin plate, about four times longer than broad, terminated below by a funnel; about the middle of this cone or funnel is a septum or diaphragm, pierced with holes, which when used is to be covered with a thin layer of carded cotton; over this is to be placed the powder to be operated upon, and this covered by another pierced plate. The apparatus should not be too large, it should not contain more than 4 or 5 lbs. of powder; if a larger quantity of any article is to be treated, it is better to divide it between several different instruments. It is also essential that the lower part be furnished with a stop-cock. This apparatus is calculated for water or alcohol; if etherial solutions are wanted recourse should be had to the apparatus of M. Robiquet.

The degree of fineness of the powder has much influence on the result. It is from using substances too finely pulverized that both M. Guillermond and myself as well as the MM. Boullay have thought that those articles which contained much mucous matter could not be advantageously treated by this process, but the fact is, on the contrary, that there are very few substances to which it is not applicable.

When leaves, flowers, &c. are operated upon, after having dried them, so as to have become friable, they are to be rubbed through a wire sieve containing fifteen meshes to the inch; any nerves, &c. that remain are to be cut and pounded in a mortar or passed through a hand mill. It is difficult to lay down any rules as to the fineness of different powders. Mucous substances should be in coarser particles than others, and where alcohol, and more especially ether, is employed, fine powders are the best.

It is equally difficult to lay down any rule as to the degree of firmness with which the powder is to be packed in the cylinder. Experience alone can teach this, and it can only be acquired by practice; for each substance seems to require some difference in its treatment, and the fineness of the powder, as well as the quantity operated upon, also exercise an influence in this respect. Thence it results that though this operation is simple in theory, it becomes difficult in actual practice, requiring much skill and habitude of manipulation.

The fluid is to be poured over the powder so as to form a stratum over the whole surface; it then penetrates in an equal manner, chasing the atmospheric air contained in the powder before it; the surface of the powder is to be kept covered during the whole time the operation lasts. When it is perceived that the fluid runs through very rapidly it is a proof that the powder is not packed tight enough; it must therefore be compressed by means of the upper diaphragm. On this account it should be of metal, rather than of paper or linen. The too rapid escape of the fluid may also be arrested, as advised by M. Dausse, by partially closing the stop-cock, and only permitting the liquid to escape in a small stream, but a proper packing of the powder in the first instance is the best means of obtaining concentrated infusions, &c. and of preventing the different strata from becoming mixed.

MM. Boullay have advised the powders to be used in a dry state; M. Dausse gives the same direction for compact substances which do not augment sensibly in bulk on the addition of water; a slight enlargement in this case is an advantage, as it

diminishes the porosity of the substance, and consequently the rapidity with which the fluid passes through. The augmentation of bulk, on the contrary, is a disadvantage, when it is too great, as happens with substances of an open texture, as well as with articles containing much mucus. I hence prefer employing a method advised by M. Dausse for certain substances, but which is applicable to all. It consists in moistening the powder with half its weight of cold water, and letting it macerate for some hours before introducing it into the apparatus. By this means, each article augments in bulk in proportion to its texture; the soluble portions are softened, and the powder is more speedily and completely exhausted.

The quantity of water indicated is sufficient to moisten most vegetable powders; it must be reduced to one-half with galls, but it is rarely necessary to augment it. Displacement is to be performed with cold water, except with certain substances, as poppy flowers, senna, &c., the soluble portions of which are better acted upon by boiling water. As before mentioned, the powders are to be pressed or packed in the cylinders with a force which varies with almost every one of them; the following examples, however, may give some idea of the relative differences that exist, though it is by no means to be taken as an unvarying guide.

The following are to be compressed forcibly:

Arnica, Chamomile,

Hops, Quassia,

Pariera brava, and all other very ligneous substances.

To be compressed tolerably firmly:

Bistort, Kahirica,

Dulcamara, Ipecacuanha,

Cinchona, Ratanhy,

Liquorice, Sarsaparilla,

Valerian, and substances of a ligneous texture.

To be moderately compressed:

Wormwood, Belladonna,

Aconite, Conium,

Chicory, Rhus radicans,

Stramonium, &c.

To be slightly compressed:

Burdock,	Gentian,
Borage,	Galls,
Polygala,	Parsley root,
Saponaria, &c.	

Not to be compressed:

Poppy flowers,	Rhubarb,
Red roses,	Saffron.

Poppy capsules cannot be lixiviated with water, and this operation is difficult with gentian, and more especially with rhubarb. This latter should be in a very coarse powder, and should be previously moistened with an equal weight of water; and even then the process succeeds only in very skilful hands.

When water is passed through a layer of vegetable matter, the first portions are highly charged with the soluble portions, but it gradually becomes less so: more water should be used than is indicated by theory; first, because the soluble matter being contained in the cells of the vegetable, the fluid cannot act on it at once; secondly, because the different strata of fluid readily mix with each other. This has been observed by M. Baudrimont in operating on the pulp of beets, and M. Guillermond has proved the same fact by passing a solution of an extract through an inert powder, and endeavouring to displace this with cold water.

In lixiviation, water flows through much slower than alcoholic fluids, because it dilates the organic tissue and also forms viscous solutions with the mucous principles. It also adheres more firmly to the surfaces of the grains of the powder, so that whilst the upper strata of water readily force downwards the fluid interposed in the spaces between the particles of the powder, it with difficulty detaches those portions which adhere to the surfaces of this powder. This was also observed by M. Boullay with regard to oil, water forcing out every drop of this substance that was interposed between the grains of powder, but leaving all those which adhered to the surfaces of the particles.



The first trials of this process in pharmaceutic preparations were made by Count Real who operated in different modes, facilitating the passage of the fluid by means of pressure produced by a column of water, by mercury, or by an air pump; similar instruments have since been proposed by Payen, Geiger, Zenneck and Beral. MM. Boullay on the contrary are of opinion that the pressure is useless, and that the operation succeeds as well when no such means are used. M. Baudrimont, on the other hand, is convinced, that when pressure is used, the different strata of fluid are less apt to mix with each other. This pressure cannot be indefinitely increased, for the powder at last becomes so much compressed as to prevent the passage of the fluid through it. I have also found, that the slowness with which the liquid percolates is an advantage; as it must have time to penetrate the cells of the plant and dissolve the substances contained in them. If the rapidity of the flow is increased, the powder is not exhausted.

The above applies to displacements with alcohol as well as to those with water; except that the upper part of the cylinder should be provided with a cover to prevent the evaporation of the alcohol; as the organic tissues do not swell on contact with this fluid as they do with water, the process succeeds better; even poppy heads may be treated with advantage. It is advantageous that the powder should be previously moistened with half its weight of the spiritous liquor. Each substance also requires to be compressed in a different manner, but as a general rule they all require more pressure than when water is used, as they swell less, and because, however slow the percolation may be, there is no fear of fermentation.

When a powder has been exhausted by means of alcohol, it remains impregnated with a portion of this fluid, which should be extracted. MM. Boullay propose to accomplish this by displacement with water, but I have not found this to succeed, and M. Guillermond has shown the fallacy of this method by several well conducted experiments; in these he found that the alcohol became mixed with the water in proportions that went on increasing.

Lixiviation is only proper where concentrated infusions of animal or vegetable substances are required; in other cases it is superfluous.

*Bull. gen. de Therap.*

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ART. XXXV.—ON EXTRACTS OF THE SOLANEÆ CONTAINING GREEN FECULA. By MM. M. SOLON and SOUBEIRAN.

THE extracts prepared from the unpurified juices of plants, and consequently containing green fecula, have been highly praised by Storek, and are generally considered as efficacious preparations. In the greatest number of plants, what is improperly termed green fecula, is a mixture of chlorophylline, coagulated gluten, &c. &c. all of which are without any medical properties, but it would be wrong to suppose that this was the case in every instance; and it is very doubtful if what is true as regards most vegetables is applicable to the active species on which Storek experimented, though at the same time we may be permitted to doubt the validity of the practice of those pharmacutists who considering the green fecula as the only active part of these plants, have not hesitated to replace them in many preparations by the fecula obtained from them. If their opinion was founded on facts, vegetable juices deprived of their fecula by coagulation, would be destitute of all active properties, which is far from being the case.

In the absence of chemical observations on the composition of the green fecula of the Solaneæ, we have resorted to experience to determine the point, for if this green fecula is active, it should be always united to extracts; if, on the contrary it adds nothing to their remedial virtues, it should be rejected as it only adds to their bulk. It is scarcely necessary to say that our experiments having been made on belladonna, hyoscyamus and stramonium, our conclusions are applicable to these plants only, and we do not pretend to extend them by induction to other vegetable juices.

Our experiments were made with two kinds of green fecula; the first, which we shall term the insoluble matter, is the substance held in suspension in the juice after expression.— It may be separated by passing the juice through a linen cloth to remove any fragments of the plant, and afterwards filtering through paper; the residue is to be well washed with pure water.

The second kind of green fecula, is the coagulum that forms when the juice after having been strained through a cloth, but not filtered, is subjected to the action of heat; it contains all the substances found in the first, and also albumen in a state of coagulation. This fecula was also purified by repeated washings before it was used.

As these green feculas, and especially the last, acquire much density in drying, and hence would be difficult to administer, we took the precaution whilst they were still in a soft state, of triturating them with sugar, and drying the mixture in a stove, thus obtaining a finely divided powder.

*Insoluble green fecula of belladonna.* This was administered to two patients; in the first, a woman of sixty years of age, affected with catarrh and chronic gastritis; we commenced with one grain and augmented the dose in the same proportion every day; on the tenth day some effect appeared to be produced, the patient stating that she experienced slight vertigoes. The quantity was increased to fourteen grains without inducing any dilatation of the pupil, any headache or modification of the pulse, or even any derangement of the digestive functions.

The second trial was made on a female of thirty-three years of age, convalescent from an attack of articular rheumatism. The dose of the fecula was increased to twenty grains without producing any appreciable effect.

*Green fecula of belladonna by coagulation.* This was administered to a woman aged 20, affected with rheumatic pains. We commenced with two grains, augmenting the

quantity daily in the same proportion. When fourteen grains had been taken, the patient complained of pain in the throat; she rested well, but talked in her sleep, which she had not previously done; she also experienced sudden but transient cramps in her legs. When the dose was increased to sixteen grains, she suffered much from the pain in the throat, had distressing and frightful dreams, a sensation of weight in the head; but there was no dilatation of the pupil, and no irregularity of the pulse; the rheumatic pains were, however, removed. On discontinuing the remedy, all the above symptoms disappeared in a short time.

The second trial was on a young man, aged 20, affected with phthisis. After taking sixteen grains, he complained that his sleep was not as tranquil as formerly, but no other change was produced.

In a third patient, aged 44, also consumptive, the first symptoms of the pain in the throat were after the dose had been increased to ten grains; at fourteen they rapidly increased, with the addition of some headache, but no dilatation of the pupil; at sixteen, some trembling of the hands, sleep tranquil. On augmenting the dose, the trembling became greater, but no change was produced in the disease.

*Insoluble green fecula of hyoscyamus.* A single trial was made with this on a patient, aged 22, convalescent from a pneumonia. Ten grains produced no effect, twelve caused a slight disturbance of the sight; and the sleep was somewhat disturbed, but no unpleasant dreams.

*Green fecula of hyoscyamus by coagulation.* It was tried on a patient affected with an habitual headache. The dose was augmented in the ratio of two grains each day. After ten had been administered, the sleep became disturbed, but there was no dilatation of the pupil; after fourteen grains, the patient slept better, but complained of uneasiness in his legs; after eighteen grains, he experienced nausea, want of sleep, and sense of weight in the head. On discontinuing the medicine, the symptoms soon disappeared.

*Green fecula of stramonium.* Analogous experiments were made with the two kinds of fecula afforded by the stramonium. Neither of these products had any physiological or therapeutic effect on the ten patients to whom they were administered. Their use was commenced in doses of one grain, gradually augmented to twenty, without causing any perceptible action. In some cases, five grains were given at a dose, then fifteen, and even twenty, without any beneficial result.

From these experiments it may be assumed that the green fecula left in the extracts made from the Solaneæ can add nothing to their properties, and also that it is probable on the contrary, that it diminishes the efficacy of these preparations in the exact proportion to the quantity present. If these feculas have any remedial properties, it must be evident that they are much feebler than those of the principles retained in the juice, and in fact, it may be assumed, that any action they may exercise on the system, is owing to the presence of some of these principles, rather than to any inherent virtue of the fecula; and what seems to corroborate this, is that the coagulated fecula displays the most power. We are, however, far from wishing to assert that the green leaves of the Solaneæ, owe all their properties to a small quantity of soluble matters, but do maintain that the presence of green fecula diminishes the power of the extracts. It may be objected that results obtained by Storck and other practitioners are opposed to this view of the subject; but it should be recollected, that to diminish the activity of a remedy is not to destroy its powers, and above all, that Storck prepared his extracts by a very gentle heat, whilst all other pharmacutists of his day, used an elevated temperature in making these preparations, thus injuring them and in fact depriving them of their most active qualities.

*Bull. gen. de Therap.*

ART. XXXVI.—REMARKS ON A METHOD PROPOSED BY DR. THOMSON, FOR DETERMINING THE PROPORTIONS OF POTASSA AND SODA IN A MIXTURE OF THE TWO ALKALIES, WITH THE APPLICATION OF A SIMILAR INVESTIGATION TO A DIFFERENT METHOD OF ANALYSIS. By A. D. BACHE, Professor of Natural Philosophy and Chemistry, University of Pennsylvania.

IN a recent number\* of the "Records of General Science," Doctor Thomson gives the following method of determining the proportions of potassa and soda in a mixture of the two alkalies. The method is accompanied by an example of its use.

"1. Convert the mixture of potash and soda into sulphates, render these sulphates anhydrous by ignition in a platinum crucible, and determine their weight. Let it amount to 29 grains.

"2. Dissolve the two sulphates in water, and throw down the sulphuric acid by chloride of barium. Wash the sulphate of barytes obtained, dry it and weigh it after ignition. Let the weight be 43.5 grains, indicating 15† grains of sulphuric acid.

"3. Separate any excess of barytes that may have been added to the liquid, by the cautious addition of dilute sulphuric acid. Filter, evaporate to dryness, and ignite. The salt thus obtained will consist of the mixture of potash and soda converted into chloride of potassium and sodium. Weigh this salt. Let the weight be 24.5 grains.

"Now the atom of potash is 6, and that of soda 4: and it is

\* January, 1836. On the Method of Determining the Proportions of Potash and Soda, when the two Alkalies are mixed together. By Thomas Thomson, M. D., F. R. S. L. and E., Regius Professor of Chemistry in the University of Glasgow.

† The equivalents of baryta and sulphuric acid are here assumed as 76 and 40 respectively, referring them to the hydrogen unit.

obvious from paragraphs 1 and 2, that the mixture of potash and soda will weigh 14.

“Let the [number of] atoms of potash in the mixture be  $x$ , and those of soda  $y$ , it is plain that we have:

$$6x + 4y = 14, \text{ and } x = \frac{14-4y}{6}$$

“By comparing paragraphs 2 and 3, it is obvious that the weight of the chlorine in the 24.5 grains of the mixed chloride obtained is 13.5 grains. For it must be equivalent to the 15 grains of sulphuric acid. In this mixed chloride the potash is converted into potassium, and consequently its atom only weighs 5, while the atom of sodium weighs 3. We have, therefore,

$$5x + 3y + 13.5 = 24.5 \text{ and } x = \frac{11-3y}{5}$$

If we equate these two values of  $x$ , we have

$$\frac{14-4y}{6} = \frac{11-3y}{5}$$

By solving this equation, we obtain  $y=2$ . From which we deduce  $x=1$ .

Thus it appears, that in the supposed mixture there were 6 grains of potash and 8 grains of soda.”

Now it seems to me that the third step in the analysis, namely, that contained in paragraph 3, is unnecessary, all the numbers required for the calculation having been obtained by the first and second steps.

By the first step we obtain the weight of the mixed sulphates; by the second the amount of sulphuric acid present, whence results the weight of the mixed alkalis. But incidentally we have obtained the quantity of oxygen present in the mixed alkalis; for the chloride of barium and the sulphates of potassa and soda have by their reaction formed sulphate of baryta, and chlorides of potassium and sodium. And the oxygen of the baryta in the sulphate of baryta, is equal to the oxygen of the two alkalis. Subtracting this from the weights of the alkalis we have, without the necessity for the third

step proposed by Doctor Thomson, the weights of the metals. These weights furnish his second equation.

In the example referred to, we have found by comparing paragraphs 1 and 2, the weight of the mixed alkalies to be 14, whence calling  $x$  and  $y$  the unknown number of equivalents of the potash and soda respectively, resulted the equation

$$6x + 4y = 14, \text{ and thence } x = \frac{14 - 4y}{6}$$

From the second paragraph the weight of sulphate of baryta obtained is given 43.5 grains; whence using the same equivalents as Doctor Thomson has employed, the baryta is found to be 28.5 grains, of which 25.5 grains is barium and 3 grains oxygen. Deducting this oxygen, which belonged to the alkalies, from the weight of the mixed alkalies, we have 11 grains for the weight of the metals, and the second equation given by Doctor Thomson.

$$5x + 3y = 11, \text{ or } x = \frac{11 - 3y}{5}$$

It is plain that these remarks will be true if the nitrate of baryta should be substituted for the chloride of barium in obtaining the quantity of sulphuric acid present; for the quantity of oxygen in the baryta of the precipitated sulphate, will always be equal to that in any protoxide, or protoxides, saturating the same weight of acid.

The third step in the proposed analysis is therefore superfluous, unless used as a means of verification.

I propose now to obtain, as Doctor Thomson has done, in the sequel of his paper, general equations for calculating the weights of the alkalies from the analysis, omitting only a reference to the third step, which has been shown to be unnecessary. As algebraic notation is repulsive to some who may choose to refer to this method of analysis, I will endeavour finally to prove the results by arithmetical processes, and to point out a simple method of calculation.

It seems to me more convenient to determine the absolute weights of the alkalies from a formula, rather than the number of equivalents.



Let  $v$  be the weight of the potassa in the mixture;  $z$  that of the soda. Let  $m$  be the weight of the mixed sulphates obtained, as stated in paragraph (1,) and  $n$  the weight of the sulphate of baryta obtained as in paragraph (2,) then using 76\* as the weight of the equivalent of baryta, and 116 as that of sulphate of baryta, the baryta in  $n$  will be  $\frac{19}{29}n$ ; and the oxygen

contained in this baryta will be  $\frac{2}{29} n$ . But the oxygen in  $v$

grains of potassa is  $\frac{v}{6}$ , and in  $z$  grains of soda is  $\frac{z}{4}$ , and since the oxygen in the alkalies is equal to that in the baryta,

$$\frac{v}{6} + \frac{z}{4} = \frac{2}{29}n, \text{ or } 58 v + 87 z = 24 n \dots (a.)$$

Again, the sulphuric acid in  $n$  grains of sulphate of baryta is  $\frac{10}{29}n$ , therefore the alkalies in the mixed sulphates (1) will

be  $m - \frac{10}{29}n$ ; that is

$$v + z = m - \frac{10}{29}n = \frac{29 m - 10 n}{29}$$

$$\text{or } 58 v + 58 z = 58 m - 20 n \dots (b.)$$

combining this equation with (a,) we find  $z = \frac{44 n - 58 m}{29}$ , and,

$$v = \frac{87 m - 54 n}{29}.$$

These formulæ lead to the following rules, the analysis having been made as described.

1st. For the weight of the soda. From 44 times the weight

\* I have used throughout the equivalent numbers given by Doctor Thomson in the seventh edition of his System of Chemistry, in order to preserve uniformity in the results.

of the sulphate of baryta (2,) take 58 times the weight of the mixed alkaline sulphates (1) and divide the difference by 29.

2d. For the weight of the potassa. From 87 times the weight of the mixed sulphates (1) take 54 times the weight of the sulphate of baryta (2,) and divide the difference by 29.

In the example referred to by Dr. Thomson,  $m = 29$  and  $n = 43.5$ , whence,

$$z = \frac{44 \times 43.5 - 58 \times 29}{29} = \frac{1914}{29} - 58 = 8; \text{ and } v = 87 - 81 = 6 \text{ grs.}$$

The following arithmetical process may be substituted for the algebraic one.

Having found the weight of the mixed alkaline sulphates (1) and the sulphuric acid which they contain (2) the weight of the mixed alkalies is known.

The oxygen which these mixed alkalies contain is known, being equal to that of the baryta in the precipitate of sulphate of baryta (2,) or  $\frac{2}{29}$ ths of the weight of that sulphate.

Potassa contains  $\frac{1}{6}$  ( $\frac{2}{12}$ ths,) and soda  $\frac{1}{4}$ th ( $\frac{3}{12}$ ths,) of its weight of oxygen. The oxygen of the mixed alkalies, found as just stated above, is equivalent to  $\frac{2}{12}$ ths of the weight of the potassa, and  $\frac{3}{12}$ ths of the weight of the soda; that is to  $\frac{2}{12}$ ths, or  $\frac{1}{6}$ th of the weight of the mixed alkalies, together with  $\frac{1}{12}$ th of the weight of the soda. Therefore taking from the weight of the oxygen in the mixed alkalies,  $\frac{1}{6}$  of the weight of the alkalies themselves, the remainder will be  $\frac{1}{12}$  of the weight of the soda.

From which is deduced a very simple rule.

*Find, from the steps of the analysis, the united weights of the alkalies, and the weight of the oxygen which they contain. Take  $\frac{1}{6}$ th of the former weight from the latter, and multiply the difference thus found, by twelve. The result will be the weight of the soda. Subtract this from the weight of the mixed alkalies, the remainder will be the potassa.*

To apply this to the example in which the weight of the mixed sulphates is 29, and of the sulphate of baryta, equivalent to their acid, is 43.5 grains.

43.5 grains of sulphate of baryta contain 15 of sulphuric acid. The united weights of the alkalies is therefore 14;  $\frac{1}{6}$ th of which is  $2\frac{1}{3}$ . The oxygen of the baryta, in 43.5 grains of the sulphate of baryta, is 3 grains. Taking  $2\frac{1}{3}$  from three, we have  $\frac{2}{3}$ ds, which multiplied by 12 gives 8 grains for the weight of the soda. This taken from 14 leaves 6 grains for the weight of the potassa in the mixture.

At the suggestion of my friend, Professor H. D. Rogers, I am induced to extend the foregoing method of calculation to the usual way of determining the quantities of the alkalies by their conversion into the chlorides of their metallic bases, avoiding the ordinary step which requires their separation by the use of chloride of platinum, by determining the chlorine in the mixture, by nitrate of silver.

(A) The alkalies are to be converted into muriates, if not already in that state, by the ordinary steps of mineral analysis. These being evaporated to dryness, ignited and weighed, will give the amount of chlorides of potassium and sodium which are present.

(B) Dissolve the mixed chlorides in water acidulated with nitric acid. Nitrate of silver will throw down the chlorine, and by treating the precipitated chloride of silver in the usual way, the quantity of chlorine is deduced from the weight of the fused chloride.

To calculate the weights of the alkalies; let  $v$  and  $z$  represent the weights of the potassa and soda respectively;  $c$  the weight of the mixed chlorides (A,) and  $d$  that of the chloride of silver (B.) Using 146 as the equivalent of chloride of silver,  $d$  grains of the chloride contain  $\frac{1}{7}\frac{8}{3}d$  grains of chlorine; the weight of the metals in the mixed chlorides (A) is therefore  $c - \frac{1}{7}\frac{8}{3}d$ . But  $v$  grains of potassa contain  $\frac{5}{6}v$  of potassium, and  $z$  grains of soda,  $\frac{3}{4}z$  of sodium. Whence  $\frac{5}{6}v + \frac{3}{4}z = c - \frac{1}{7}\frac{8}{3}d$ .

The oxygen contained in the mixed alkalies is  $\frac{8}{3}$ ths, or  $\frac{2}{9}$ ths of the chlorine in the chlorides of their metallic bases, or is  $\frac{2}{9}$ ths of  $\frac{1}{7}\frac{8}{3}d$ , or  $\frac{4}{3}$ ths  $d$ . And as  $v$  grains of potassa contain  $\frac{1}{6}v$  grains of oxygen, and  $z$  grains of soda,  $\frac{1}{4}z$  grains of oxy-

gen, we have a second equation containing  $v$  and  $z$ ;  $\frac{1}{6}v + \frac{1}{4}z = \frac{4}{7\frac{2}{3}}d$ , or  $\frac{5}{6}v + \frac{5}{4}z = \frac{20}{7\frac{2}{3}}d$ . Combining this with the equation obtained above,  $z = \frac{7\frac{6}{3}}{7\frac{2}{3}}d - 2c$ , and  $v = 3c - \frac{9\frac{0}{3}}{7\frac{2}{3}}d$ .

Whence result the following simple rules:

*To obtain the soda from the method of analysis stated above, from  $\frac{7\frac{6}{3}}{7\frac{2}{3}}$  rds of the weight of chloride of silver (B,) take twice the weight of the mixed chlorides (A.)*

*To obtain the potassa. From three times the weight of the mixed chlorides (A,) take  $\frac{9\frac{0}{3}}{7\frac{2}{3}}$  rds of the weight of the chloride of silver (B.)*

To apply this to the example before discussed, suppose the weight of the mixed chlorides to be 24.5 grains, and of the chloride of silver 54.75 grains. From  $\frac{7\frac{6}{3}}{7\frac{2}{3}}$  rds of 54.75, or 57, take thrice 24.5, or 49, the remainder, 8, will be the grains of soda in the mixture.

From three times 24.5, or 73.5, take  $\frac{9\frac{0}{3}}{7\frac{2}{3}}$  rds of 54.75, or 67.5, the remainder, 6 grains, will be the potassa.

An equally simple method of calculation may be obtained without resort to algebra. By the second step of the analysis the chlorine in the mixed chlorides, of the metallic bases of the alkalies, is obtained, being  $\frac{1\frac{8}{3}}{7\frac{2}{3}}$  rds of the weight of the chloride; subtracting this from the weight of the mixed chlorides obtained by the first step, we have the weight of the metallic bases. Taking  $\frac{2}{9}$ ths of the weight of the chlorine, we have the oxygen requisite to form the alkalies. Potassa contains  $\frac{1}{6}$ th, and soda  $\frac{1}{4}$ th of the weight of oxygen;  $\frac{5}{6}$ ths of the potassa and  $\frac{3}{4}$ ths of the soda, will be equal in weight to five times the oxygen, the weight of which has just been obtained. But potassa contains  $\frac{5}{6}$ ths of its weight of potassium, and soda  $\frac{3}{4}$ ths of its weight of sodium, and the united weights of these metals has also been obtained as above. Taking this latter sum from the former, we find that *one-half the weight of the soda is equal to five times the oxygen less the weight of the metals. One sixth of the weight of the potassa is equal to the weight of the oxygen, less one-fourth the weight of the soda.*

Resuming the example before employed, in which the weight of the mixed chlorides is 24.5 grains, and of the chlo-

ride of silver 54.75 grains. The chlorine in 54.75 grains of chloride of silver is 13.5 grains. Subtracting this from 24.5 grains, we have 11 for the weight of the metallic bases of the alkalies. The oxygen equivalent to 13.5 grains of chlorine is 3 grains.

By the rule,  $5 \times 3$  or 15, less 11, the weight of the metals, is half the weight of the soda; the soda is, therefore, 8 grains. The weight of oxygen, 3 grains, less one-fourth of the soda, 2 grains, gives one-sixth of the weight of the potassa. The potassa is therefore 6 grains.

It is readily seen that the general principle to which these results refer themselves, may be used with great effect in avoiding a difficult step in chemical analysis, by the substitution of a less direct, but more simple one, aided by easy calculations.

This problem is only a particular case of a general one, well deserving the attention of analytical chemists.

*Journ. Franklin Instit.*

ART. XXXVII.—ON PHLORIDZINE. BY L. DE KONINCK, M. D.

As yet, the history of phloridzine, a bitter principle existing in the bark both of the trunk and roots of apple, pear, cherry and plum trees, has been traced in a very imperfect manner; this deficiency has been supplied by the following account of this article, read by Dr. De Koninck before the meeting of naturalists at Bonn.

The principal properties of phloridzine are the following: it has a very bitter taste; it crystallizes in silky spiculæ of a dead white colour when in masses, or in long slender prisms or tables when crystallized with care. In this case it has a yellow tinge, and the crystals have a pearly reflection. Water from  $32^{\circ}$  to  $71^{\circ}$  only dissolves about  $\frac{1}{1000}$ . From  $71^{\circ}$  to  $212^{\circ}$  F. this fluid dissolves it in all proportions; it is also

very soluble in pure alcohol, at ordinary temperatures, though it is but slightly so in ether, even when boiling. It has no action on test papers. Its specific gravity is 1.4298.

When heated to  $212^{\circ}$  it loses all its water of crystallization, of which it retains  $\frac{7}{100}$  when dried at ordinary temperatures. If it is once deprived of this water of crystallization, it does not regain it by being exposed to moisture. Its point of fusion is  $226^{\circ}$  and that of boiling  $350^{\circ}$ ; at  $379^{\circ}$  it begins to be decomposed, giving rise to a small quantity of benzoic acid, to pyroacetic spirit, and a brown oil heavier than water. The latter products are not found until the temperature has been raised to about  $572^{\circ}$ .

Concentrated acids dissolve it without decomposition, when it is not deprived of its water of crystallization, but if this be driven off, sulphuric acid will act upon it energetically and form a compound of a dark reddish brown colour. Nitric acid acts in the same way when cold, but with the assistance of heat transforms it into oxalic acid. Hydrochloric acid changes it into an insoluble whitish substance. When treated with  $\frac{1}{20}$  of sulphuric acid, and a sufficient quantity of water, it is not transformed into sugar, even if boiled for eight or ten hours.

The alkalies as well as concentrated acetic acid dissolve it without alteration. Chlorine, bromine, and iodine, act vigorously upon it, producing a brown resinous substance, insoluble in water, but soluble in alcohol, as well as in the hydracids corresponding to each of these bodies, with a great extrication of heat.

The tritosulphate of iron forms a brown precipitate with it; the tritohydrochlorate of the same metal colours its solution of a deep reddish brown, without occasioning any precipitate. The protosulphate has no action on it, as also all the other neutral metallic salts. Subacetate of lead produces an abundant white precipitate, which becomes yellowish on drying. Chloride of lime colours a solution of phloridzine of a bright yellow, which becomes brown in a few days, but produces no precipitate. Gelatine does not precipitate it. An aqueous solution of chlorine causes a yellow deposit

When subjected to analysis, by the method of Leibig modified by Mitscherlich, 0.5135 grammes gave per 100 parts

	Carbon	59.905
	Hydrogen	5.569
	Oxygen	43.526
0.812 grammes gave	Carbon	51.10
	Hydrogen	5.77
	Oxygen	43.13

On the other hand Dr. De Koninck found the combination of phloridzine with oxide of lead, gave 57.26 of oxide, and 42.74 of phloridzine, and hence obtained, as the atomic weight of the latter, 1040.88. If it be admitted that phloridzine is formed of  $C^{14} H^{18} O^3$ , the atomic number would be  $\frac{2082.48}{2} = 1041.24$ .

The preparation of this substance is very simple. The fresh bark of the root of the apple tree, (the dry bark contains scarcely any,) is to be boiled for two hours with sufficient water to cover the bark; the decoction is to be decanted, and a second one made by the addition of more water. On uniting the two decoctions and permitting them to stand for twenty-four hours, a deposit of phloridzine in granular crystals will take place. These are to be treated with distilled water and animal charcoal to purify them. An additional quantity is obtained by evaporating the mother waters to  $\frac{1}{5}$ . At this degree of concentration all the phloridzine is deposited. This method will afford about  $\frac{3}{1000}$ . There is another and a better plan which will give  $\frac{5}{1000}$ . It consists in digesting the fresh root in weak alcohol at a temperature of  $120^\circ$  for about eight or ten hours, distilling off the greater portion of the alcohol, and crystallizing the residue.

Phloridzine has great analogy to populine, but at the same time has many distinguishing characteristics. Thus, it is soluble in 1000 parts of cold water, whilst populine requires 2000; it produces a precipitate with the tritosulphate of iron and subacetate of lead, whilst populine does not. When treated with nitric acid it does not, like that substance, afford a bitter, but is converted into oxalic acid. Like populine,

however, it readily crystallizes from its aqueous solution, and a small quantity, three grammes for example, dissolved in warm water, is sufficient to render a glass vessel containing two pints of water, perfectly opaque. This is owing to the crystallization of the phloridzine on the cooling of the fluid.

This substance has been analyzed by M. C. Petersen, with results differing from those of Dr. De Koninck.

0.301	gave	0.620	carbonic acid and	0.158	water
0.239		0.492		0.125	

Or in the 100 parts

I.		II.	
Carbon	56.955	56.921	= 4 atoms
Hydrogen	5.826	5.810	= 5
Oxygen	37.219	37.274	= 2

Phloridzine has been successfully employed by Dr. De Koninck in several cases of intermittent fever, in doses of 10 or 15 grains.

*Journ. de Pharm.*

#### ART. XXXVIII.—ON THE PROPERTIES OF DRY SULPHURIC ACID. BY M. AIME.

WITHIN a short time past, a series of experiments have been given to the public, which have demonstrated the existence of a series of bodies of great importance in the study of Isomery, both from the facility with which they can be obtained and the decided character of their crystalline forms. These considerations induced me to try whether ether or alcohol could not be formed from the carburetted hydrogen of marshes. To attain this, I attempted to collect this gas by means of hydrated sulphuric acid, hoping that as bicarburetted hydrogen might be transformed into ether by means of sulphuric acid and barytes, that the same would take place with



marsh miasmata, but not the smallest quantity was absorbed. I then had recourse to another mode; instead of hydrated sulphuric acid, I took anhydrous acid, but obtained no better results; at the same time the action of this anhydrous acid on bicarburetted hydrogen is very striking. There was a great absorption of it, decomposition, with formation of water, sulphurous acid and a deposit of charcoal. This difference of action affords a good character for the separation of bicarburetted from protocarburetted hydrogen.

The dry acid of commerce, with which I operated, contains according to some chemists a certain proportion of water in combination with it. Surprised to find that two bodies formed of the same elements, should act so differently with sulphuric acid, I determined to examine the action of various hydrogenated substances on this same acid.

The first of these bodies I experimented on was phosphuretted hydrogen, with which I obtained some singular results. Having introduced perphosphuretted hydrogen into a bell glass over mercury, and placed in it a vial containing dry sulphuric acid, yellow fumes were formed which were gradually deposited on the sides of the vessel. The next day this yellow powder was transformed into violet coloured drops, and the vial contained an indigo blue fluid. The perphosphuretted hydrogen had assumed the form of protophosphuretted hydrogen.

I endeavoured to reproduce this peculiar compound by heating phosphorus in both dry and moist sulphurous acid, but without success. Having placed phosphorus in contact with dry sulphuric acid, inflammation took place in a short time, with the formation of sulphurous and phosphoric acids. I am, however, inclined to believe that the blue compound did not contain hydrogen.

Arseniated hydrogen was decomposed; and a deposition of arsenic ensued, which was transformed into arsenic acid, whilst at the same time there was a corresponding solution of sulphurous acid. I did not operate on selenuretted, &c. &c.

hydrogens, but it is probable that analogous phenomena would have occurred with these different compounds.

I next experimented with the compound acids, commencing with the hydrochloric. A vial of the dry sulphuric acid was introduced into a bell glass, containing this gas; this caused a sensible diminution of its volume. The bell glass was soon filled with mercury; I passed an additional quantity of gas into it, but the absorption still continued, until the glass had been six or seven times refilled. The sulphuric acid became liquid, was perfectly limpid, transparent and colourless.

The same experiment was tried with concentrated sulphuric acid, but there was no absorption. Having succeeded with the hydrochloric, I next tried the hydrobromic and hydroiodic with the same results, though with some variation of the process, as I was obliged to employ a caoutchouc bag to collect these gases. The compounds obtained were of a red or red brown colour.

Finally, I operated on deutoxide of nitrogen, which was also absorbed. Such are the principal results I have obtained with the dry sulphuric acid. These researches, although incomplete, show that this body may be useful in certain analyses, for which reason I have judged them worthy of publication.

*Journ. de Pharm.*

## ART. XXXIX.—ANALYSIS OF THE GUACO.

BY M. FAURE.

I undertook the chemical examination of the leaves of the Guaco, soon after the Royal Society of Medicine of Bordeaux received the dried plant from Dr. Chabert of Mexico. This article was announced as a specific in cholera, which was then prevailing in our city. At this time my brother who was residing in Mexico, informed me that he was engaged in the analysis of the plant. I therefore abandoned the undertaking being convinced that he would be enabled to throw much more light on the subject than myself. Some time afterwards my brother wrote to me that he had obtained a resinous substance, from the fresh plant, to which he attributed the active properties, and which he had named *guacine*. My brother having died before he completed his investigations, I was never able to obtain any further account of his researches on the subject.

I therefore resumed my examination of this plant, as well for my own satisfaction as to confirm the discovery made by my brother.

The leaves of the guaco as found in commerce appear to be injured both by want of care in drying them and the voyage, the latter deteriorating them very sensibly. The leaves on which I experimented were carefully selected from several bales.

*Treatment with Ether.* Thirty two grammes of the leaves in coarse powder were subjected to three successive macerations in 125 grammes of ether, each time. The different tinctures were united and filtered; they were of a dark colour and had a marked bitter taste. The filtered liquid was distilled on a sand bath till half the quantity had passed over; the residue was poured into a capsule and evaporated to dryness. This extract was

of a dark green colour, studded with yellowish points which were most evident at the bottom of the mass. When treated with cold rectified alcohol, part was dissolved, leaving as a residue a fatty substance having some analogy to wax.

The alcoholic tincture was filtered and evaporated by a gentle heat to the consistence of an extract; this was treated with cold water, which appeared to have no action on it, boiling water on the contrary became tinged of a bright yellow and acquired a very bitter taste; this solution was poured off from the green insoluble residuum, which was washed with an additional quantity of boiling water, and then dissolved in alcohol to which it imparted a beautiful green colour; it has no taste and appears to have all the characters of chlorophylline.

The aqueous solutions were united and filtered whilst hot; they were transparent, of an amber yellow colour, and bitter taste; they were evaporated to the consistence of an extract; this was dissolved in absolute alcohol, and the solution evaporated, leaving a resinoid substance of a light colour and very bitter taste, which I am persuaded is the *guacine* spoken of by my brother.

*Treatment with Alcohol.* The guaco which had been subjected to the action of ether, was then treated with alcohol at 36° as long as this had any effect upon it; the tincture was somewhat green, and slightly bitter; it was evaporated to dryness, and the residue, on being treated with boiling water and alcohol, furnished a small quantity of *guacine*.

*Treatment with Water.* The same portion of guaco was then treated with boiling water to which it imparted a dark brown colour and somewhat bitter and very astringent taste; on evaporation an astringent substance was left which I considered to be tannin mixed with extractive matter.

*Incineration.* Thirty-two grammes of guaco were incinerated in a platina crucible, and afforded four grammes of grey ash, of a very saline taste, which on being treated with alco-

hol, distilled water, hydrochloric acid and other reagents, afforded hydrochlorate and sulphate of soda, phosphate, carbonate and sulphate of lime, silica and a little oxide of iron.

From the above examination, I conclude that the leaves of the guaco contain, 1, Fatty matter analogous to wax; 2, chlorophylline; 3, a peculiar resin (guacine;) 4, extractive and astringent matter analogous to tannin; 5, woody fibre.

*Guacine.* This is of a light colour, and of a bitter taste, no smell, friable, melting at  $212^{\circ}$ , soluble in all proportions in alcohol and ether, dissolved in large proportions by boiling water, which deposits it on cooling; scarcely soluble in cold water. Concentrated nitric acid dissolves it, the solution being of a dark yellow colour; concentrated sulphuric acid dissolves it less perfectly; the solution of a dark mahogany colour; hydrochloric acid has less action upon it, and changes its colour very little; the addition of a small portion of water to the two last solutions, causes a precipitation of the guacine; this is not the case with the solution in nitric acid.

Guacine does not appear to have any alkaline reaction. The leaves appear to contain most of this resin, and next the young stems. The older stalks contain very little, but are highly charged with the astringent principle. Thirty-two grammes of the leaves afforded me 5 decigrammes of guacine; it is probable, that fresh leaves, or those carefully dried, would furnish a larger proportion.

*Journ. de Pharm.*

ART. XL.—ON SOME OF THE PROPERTIES OF MONNINA  
POLYSTACHYA. BY E. MOUCHON, Jr.

THE Monnina polystachya is a beautiful plant, belonging to the natural order Polygalæ, and Diadelphia octandria of the artificial system; it grows on the mountains of South America, in damp, shady situations, and is known to the inhabitants under the name of *yallhoy*.

The bark of the root is the only part used. The root is fusiform, simple, and about two feet long; its cortical portion is of a straw yellow colour, sometimes marked with small grayish spots; it is fibrous, about two lines in thickness, has a faint nauseous smell, and a taste at first sweetish and mucilaginous; but afterwards somewhat acrid and bitter, producing on mastication an abundant secretion of saliva, and also greatly augmenting, even in small doses, the flow from the nose, accompanied with incessant sneezing. It likewise possesses the property of producing a lather with water, like soap.

Physicians in Peru consider this bark as a powerful astringent, and as highly useful in diseases of the bowels. It is also very analogous to the Seneka snakeroot in its expectorant qualities. The following formulæ are in general use:

*Anti-dysenteric infusion.*

Cort. monnin.	6 grammes,
Aqua. bullient.	500 “

Cut the bark into small pieces and infuse for an hour in a close vessel, shaking from time to time; strain the infusion when cold; to be taken at two doses.

*Powder of yallhoy.*

Pulv. cort. monnin.	1 gramme, 3 decigrammes,
Sacch. alb.	4 grammes,

To be given at a dose.

*Pills of yallhoy.*

Pulv. cort. monnin.	1 gramme, 3 decigrammes,
Tragacanth,	q. s.

To be made into pills of 4 grains, to be taken at a dose.

*Injection.*

Cort. monnin. contus.	16 grammes,
Aqua fluvial,	1000 “

Boil in a close vessel for a quarter of an hour, or infuse for an hour, strain, divide into equal portions, and administer on the same day.

It is not only as a medicinal agent that this article is worthy of attention: from its property of forming a lather with water, it is much used to wash clothes. At Huanaco it is employed to clean silver. It is also much esteemed as a wash for the hair, which it is said to cleanse and nourish.

A chemical analysis of the monnina afforded me:

A resinous substance soluble in ether. A resin soluble in alcohol. A peculiar principle, which I have called *monnine*, and an aromatic gum.

Monnine is of a yellowish colour, uncrystallizable, unalterable in the air, except that it becomes of a darker colour; transparent, of a vitreous lustre, readily pulverizable, taste at first somewhat bitter, but soon becoming so acrid, that it may be compared to that of euphorbium. A very small quantity is capable of forming a lather with a great excess of water. It is soluble in every proportion in water, alcohol, the acids and alkaline solutions, to which it gives a deep yellow colour. These solutions are transparent. It is not soluble in sulphuric ether, nor in the fixed and volatile oils. It changes the colour of tincture of iodine to a red. It forms a red solution with nitric acid, but the colour soon fades. It changes the colour of tincture of litmus to a beautiful green. It has not this effect on syrup of violets, on which it appears to exercise scarcely any action. It does not seem to neutralize the acids, which do not decompose it, except when they are pure; in which case, they deprive it of its property of making a lather

with water. On being exposed to the action of heat, this substance swells and is reduced to a very light porous charcoal.

We do not venture to assert that this substance is a perfectly pure immediate principle, but from what has been said, it will be perceived that it is analogous to the saponine of M. Bussy, from which, however, it differs in some essential particulars.

*Bull. gen. de Therap.*

ART. XLI.—REMARKS ON THE NOTE BY M. BOUTIGNY, ON THE PREPARATION OF PROTOIODIDE OF MERCURY. By M. BERTHEMOT.

SOME years since, I paid particular attention to the iodides of mercury, and pointed out the difficulty of obtaining the protoiodide in a pure state, by double decomposition. I therefore proposed the direct combination of iodine and mercury, in exact proportions. Experience has confirmed my views. The value of this method was soon admitted, and MM. Orfila and Soubeiran adopted it as the best, as did also M. Dumas who has cited it in his work on chemistry as always affording a pure product.

What I said on this preparation in the *Journal de Pharmacie* (see Journ. Phil. Coll. Pharm. iii. 353,) would require nothing in addition if I had not met with a note on the subject by M. Boutigny in which this pharmacist, whilst admitting that my method is the simplest and most direct, asserts that it is defective, and advises its rejection as affording an indefinite product, &c. This assertion appears to me to be erroneous, and I will therefore examine the subject in detail, and thus overthrow his objections.

The formula I indicated is

1 atom mercury	1.265.822	} Mercury 61.60 per cent.
1 " iodine	789.145	
	<hr/> 2.054.967	<hr/> 100.00



The iodine is triturated with the mercury, and small portions of alcohol of 36° or 40° added to moisten the mixture, which first assumes a reddish colour but soon becomes of a yellowish green. All the mercury and iodine disappear in a short time, and the combination is effected.

The alcohol by its tendency to dissolve the iodine and the deutoiodide of mercury that forms, probably determines the combination of the two bodies. Too large a portion of the mixture should not be acted upon at a time, for there is so great an extrication of heat, that the whole mass will become fused, and a portion of the iodine will be volatilized, and of course, a compound of equal atoms will not be obtained.

The protoiodide may also be prepared by triturating 100 parts of deutoiodide of mercury with 44.50 of mercury and adding alcohol as above. In this operation the deuto is changed to a protoiodide.

I therefore employed the mercury and iodine in the proportions of atom and atom, and not as is stated by M. Boutigny in those of two of mercury to one of iodine. Moreover, it will be presently seen that the quantities of iodine and mercury which exist in the salts employed by that chemist are exactly the same as those indicated by me.

Besides, I cannot see how I could be accused of thus employing two atoms of the metal to one of the iodine. As has been shown by the experiments of distinguished chemists, the protoxide of mercury is composed of 2 atoms mercury and 1 atom oxygen, and one atom of oxygen corresponds to two atoms of iodine. The protoxide of mercury corresponds to the protoiodide. Consequently two atoms of mercury and two atoms of iodine must give the protoiodide or in other words a combination of mercury and iodine, atom for atom, and this is the combination I indicated.

I will now show that the method of M. Boutigny, which I had already tried, is far from possessing the advantages and the degree of perfection he ascribes to it.

*His formula:*

Calomel	℥iii. ʒv.	} Calomel 29 parts.
Dry hydriodate of potassa	℥ii. ʒiv.	
		} Hydriodate potassa 20 parts.

As soon as the water is added, there is, as has been stated, a formation of protoiodide of mercury, but as the decomposition of the two salts is not immediately complete and as the undecomposed hydriodate exercises an action not only on the remaining protochloride, but also on the newly formed protoiodide, this latter is partly changed into metallic mercury which mixes with the precipitate and partly into deutoiodide, which being dissolved in the water forms with the hydriodate in solution a compound salt of deutoiodide of mercury and iodide of potassium. As to the insoluble precipitate, it is formed of metallic mercury, protochloride of mercury and iodide of the same metal. This method therefore should not be followed, and even admitting that in the preparation of the protoiodide in this way that the decomposition was exact; the product would not differ from that produced by my plan.

29 parts calomel, =	{	mercury,	24.69
		chlorine,	4.31
			<hr/>
			29.00
20 parts hydriodate, =	{	potassium,	4.74
		iodine,	15.26
			<hr/>
			20.00

Hence, 100 parts of an iodide of mercury obtained in the proportions of 15.26 iodine, and 24.69 mercury, would be composed of

Per cent. mercury,	60.88
iodine,	38.12
<hr/>	
100.00	

The following formula results from the direct combination of one atom of each:

Mercury	61.60
Iodine	38.40 100.00

It is therefore evident that if the iodide could be obtained perfectly pure by the method of M. Berthemot, it would give the same results.

*Bull. gen. de Therap.*

## ART. XLII—NOTE ON LIQUID AND SOLID IODIDE OF IRON. BY E. MOUCHON.

HAVING wished to prepare this substance, I proceeded according to the directions of Dr. Dupasquier, namely:—to sixty parts of water at  $130^{\circ}$  F. in a close vessel, I added five parts of iodine and ten parts of perfectly pure iron filings; in half an hour I obtained, on filtration, seventy-two parts of a translucent but slightly yellow solution of iodide of iron.

This product having been poured into a bottle of a larger size than was necessary, soon acquired a reddish colour; this augmented in intensity till the next day, when the fluid deposited a reddish brown substance, and reassumed its first appearance. This change is readily explainable, by the great affinity of the iron for oxygen.

By filling a bottle with the solution before it cooled, and closing the vessel in such a manner as to prevent any access of air, the iodide will remain unaltered for an indefinite time; but as soon as the bottle is uncorked, decomposition begins, and there is a precipitation of oxide of iron. This alteration is therefore owing to the action of the air, and not to that of the water.

To obviate this difficulty, I thought that the best plan would be to obtain the iodide in a solid state, by subjecting the solution to a rapid, but equal evaporation.

By this process, five parts of dry protoiodide are obtained. This salt is very deliquescent, and requires to be kept in close bottles, but it should be observed that it merely deliquesces, and is not decomposed as in the former case.

## MINUTES OF THE COLLEGE OF PHARMACY.

*September 27th, 1836.*—Minutes of the Board of Trustees were read announcing to the College the resignation by Dr. R. E. GRIFFITH, of the Professorship of Materia Medica and Pharmacy, in this Institution, and also that at an adjourned meeting of the Board, held on the 26th inst. Dr. JOSEPH CARSON was duly elected to supply the vacancy.

The Board likewise communicated the following report from the committee of inspection.

*To the Board of Trustees of the Philadelphia College of Pharmacy.*

The Committee of Inspection, to whom was referred, in December last, the examination of adulterated Sulphate of Quinine, bearing the seal and label of A. DELONDRE, Nogent sur Marne, beg leave to state, that since the date of their communication to the College, several letters from M. DELONDRE and his agents in London and New York, have been placed in their hands, together with a sample of Sulphate of Quinine transmitted to the College, from M. DELONDRE, through his agent, M. CAZENOVE, of London.

Your Committee, anxious that full justice should be awarded to M. DELONDRE, and that the injurious consequences to his reputation, which might have arisen from their former report, should if possible be obviated, have lost no time in carefully examining these documents, and testing their validity by an analysis of the Sulphate sent for this purpose by that gentleman, but taken indiscriminately from a lot in the hands of his agent in London, and manufactured anterior to the reception of our published report.

They would, therefore, state that they have carefully repeated their former experiments, as well as those of M. BUSSY, referred to by M. DELONDRE, whose certificate is annexed to the above, and have also decomposed the Sulphate by means

of liquid ammonia, in order to ascertain the pure quinia contained in the Sulphate, as recommended by J. FARR, and it gratifies them exceedingly to be able to say, that all the results have shown, that the sulphate sent by M. DELONDRE is an excellent preparation, and as pure as any heretofore introduced into our market.

In making this statement, we would also observe that although our former analyses have been proved to be correct, it is more than doubtful whether the article examined by us in December last, was manufactured by M. DELONDRE. In our former report we candidly expressed our opinion that we did not believe that the article referred to had been intentionally adulterated, and attributed the impurity of it to carelessness or fraud on the part of the workmen employed by M. DELONDRE. This gentleman, however, in the most open and honourable manner, has assumed the whole responsibility, by stating that all the operations in his manufactory were carried on under his own eye, and completely absolving his workmen from participation in any adulteration, if such had been practised.

Naturally anxious however of removing any stigma from his character, he closely investigated the different steps of the process employed by him in the manufacture of Quinia, and discovered that the product obtained from the washings of the animal black (used for depriving it of colour) and of the filters, were to a certain degree rendered impure by the presence of salts of lime and magnesia, but that the proportion of these impurities was by no means so great as that noticed by your Committee on the Quinia examined by them in December last.

In conclusion, your committee would state that, in consequence of the assertion made by Dr. CHILTON, in a letter to the editor of our Journal, that FEIDLER & Co., the agents of M. DELONDRE, in New York, had ascertained that the adulterated quinia examined by J. FARR and ourselves had not been imported by them, but was a spurious article sent from London, and bearing forged labels and seals. We were induced to compare the bottles that had contained it with those trans-

mitted to the college by M. DELONDRE, and are fully satisfied that they are different in many respects, and that the name of M. DELONDRE has been surreptitiously used to cover a gross fraud.

CHARLES ELLIS, }  
E. DURAND, } *Committee of*  
JOHN C. ALLEN, } *Inspection.*

*Philad. 9th mo. 26, 1836.*

On motion, the following preamble and resolutions were adopted, and the Secretary directed to forward a copy of the same to Dr. GRIFFITH:

Whereas:—The election of Dr. ROBERT. E. GRIFFITH to a Professorship in the University of Maryland, has rendered necessary his resignation of the Chair of Materia Medica and Pharmacy in this College, the duties of which he has so satisfactorily performed,

Therefore, *Resolved* that this College duly appreciates the zeal, talents and industry, which he has manifested during the period of his connection with the Institution, and especially do they ascribe to his indefatigable exertions the prosperous condition of the Journal of Pharmacy, published under the auspices of this College, which he has so long and so faithfully edited, and tender him their sincere thanks, and best wishes, for his future prosperity and welfare.

ROBLEY DUNGLISON, M. D., &c. Philadelphia, and ROBERT PETER, M. D. &c. Lexington, Kentucky, were duly elected honorary members.

A letter of resignation from EDWARD HOPPER, was read and referred.

The College then went into an election for Trustees in place of those whose term of service was about to expire, and the tellers reported that the following were duly elected.

F. R. SMITH; THOMAS J. HUSBAND; JOSEPH SCATTERGOOD; JACOB BIGONET; JOSEPH C. TURNPENNY; PETER LEHMAN; SAMUEL F. TROTH; CHARLES SHÆAFER. Jr.

## MISCELLANY.



*Opium.*—At a late meeting of the Royal Asiatic Society, Mr. Royle gave an account of the vegetable and mineral productions of India, and among other important information, stated that the Opium now produced in India was of a very superior quality, as was shown by the quantities of Morphia obtained by Dr. Smythan:—Bengal 3; Maliva 6; Turkey 6½, and some from Bareilly as high as 8½. *London Med. Gaz.*

*Freezing Mixture.*—Four pounds of pulverized sulphate of soda, (not efflorescent) and three pounds of cold dilute sulphuric acid (seven parts of strong acid to five pounds of water, mixed the day before using.)

*Am. Journ. Sci. and Arts.*

*To render Oil casks impermeable.*—When the cask is new, and ready to receive the oil, pour into it a concentrated and hot solution of sulphate of soda, spread it well over the whole interior surface with a sponge or cloth, so that the wood may become thoroughly impregnated with the liquor. When it begins to grow cold, withdraw it, heat it again to boiling and renew the operation three or four times. Wipe off the superfluous salt with a coarse cloth, let it dry for a few hours, replace the head, the inner surface of which should have been treated in the same way, and it will be found that the pores have been effectually stopt by the salt, so as to prevent the oozing out of the oil. *Ibid.*

*Aceto-spiritous tincture of Cantharides.*—D. S. Young, Esq. gives the following formula for this preparation. Concentrated acetic acid, nine ounces; alcohol, three ounces; cantharides, four ounces. The latter to be coarsely powdered and placed in a wide mouth bottle, having a glass stopper, and the liquids added. The whole is to digest for five days in a warm place, and then be strained through flannel for use; the quantity obtained will be about eight ounces. Mr. Young says that when this solution is rubbed on the skin till a pricking sensation is felt, that a complete vesication will ensue in two or three hours. He also states that it does not cause strangury. Several other surgeons confirm the efficacy of this application, both as a rubefacient and vesicatory, and add that the pain, though more severe than that from the blistering ointment, is less permanent. *Am. Jour. Med. Sci. and Trans. Med. and Phys. Soc. Calcutta.*

*Mercaptan*.—M. Zeise states, that when the sulphovinate of potassa, baryta or lime, is heated in a distilling apparatus, with a concentrated solution of protosulphuret, deutosulphuret or hydrosulphuret of barium, the sulphovinate is changed into a sulphate, and there is formed an ethereal liquid, which is condensed with a little water in the recipient, without the disengagement of sulphuretted hydrogen. This liquid, purified and deprived of its water by means of chloride of calcium, is lighter than water, colourless, of an odour excessively penetrating, somewhat resembling assafœtida or garlic, and has an extremely strong taste. It takes fire readily, and gives off when burning the odour of sulphurous acid. Distilled with care there are obtained two substances, the least volatile of which is *Thialic ether*, and the other *Mercaptan*. This last is, a limpid fluid even at 10°; it is destitute of colour. Its odour is peculiar, and approaches that of garlic or assafœtida; its taste is sweetish and ethereal; density 0.842, boiling point 3°. It is slightly soluble in water, but largely so in alcohol or ether. It combines with potassium, giving up its hydrogen, and producing a saline mass, colourless and very soluble, which gives a yellow precipitate with the salts of lead, and a white with the deutochlorides of mercury, gold and copper. When placed in contact with the deutoxyde of mercury, the mercaptan attacks it with violence, and produces a colourless crystalline body, together with some water. The mercaptide of mercury melts at 187°; commences to change its appearance at 257°; and is decomposed at 347° with a disengagement of thialic oil. It is insoluble in water and alcohol, and is not acted upon by a concentrated solution of potash, and probably not by any of the acids except the nitric. The mercaptide of platinum changes into a sulphuret by calcination; the mercaptide of gold is colourless and destitute of lustre; the mercaptides of potassium, &c. have an alkaline reaction. In a dry state, no change is caused by a heat of 212°. In solution, the effect of heat is soon apparent. The composition of mercaptan corresponds exactly to that of alcohol.

*Am. Journ. Sci. and Ann. de Chim.*

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*Tincture of Copaiba*.—This is said to be the best form for administering the copaiba. It is made by rubbing together twelve ounces of copaiba and six of calcined magnesia, and digesting in a pint of alcohol, filtering and adding half an ounce of sweet spirits of nitre. The dose is a drachm two or three times a day, gradually increased to half an ounce.

*Am. Journ. Med. Sci. and London Med. Gaz.*

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*Quassin*.—This bitter principle has been obtained in a crystalline state, by Winckler, by digesting three ounces of pulverized quassia in two pounds of alcohol of 80°; evaporating the tincture in a water bath, dissolving the remainder in water, filtering the solution, and again evaporating in a water bath to the consistence of a thick extract; treating this



with water and alcohol of 80°, adding small portions of absolute alcohol, from time to time, as long as any bitter taste is communicated. The tincture is then filtered, evaporated in a water bath, and the dry residue treated with hot water. The filtered solution is of a wine yellow colour, and may be decolourized by means of animal charcoal; it is then to be gently evaporated, when the quassin will separate in fine prismatic crystals. The watery extract affords no crystals, but merely a yellow deliquescent mass. Quassin is soluble in water; more so in alcohol; but is scarcely acted upon by ether. On diluting the alcoholic solution, the quassin is obtained in the form of a woody mass. The aqueous solution affords a white precipitate with tannin and corrosive sublimate.

*Records of Gen. Science.*

*Chorea.*—The following mixture is said to have proved successful in the treatment of this disease, but the quantity of the cyanide is too great for most cases; it would be safer to commence with half the quantity, and increase it gradually:

R.	Tincture of castoreum	3ss.
	Musk,	
	Nit. potass.	<u>aa</u> gr. iv.
	Cyanide potassium	gr. ij.

To be mixed with eight ounces of orange flower water, and taken in spoonful doses, in twenty-four hours.

*Bull. de Therapeut.*

*Mercurial ointment.* Var Mons states that mercurial ointment can be very expeditiously prepared by adding a few drops of *Balsamum sulphuris terebinthinatum* to the mercury and fatty body used. The balsam alluded to is made by dissolving one part of flowers of sulphur in four parts essence of turpentine, on a sand bath.

*Am. Journ. Med. Sci. and Rec. Gen. Sci.*

*Volatile oil of mustard.*—M. Fauré in France and M. Hesse in Germany, have called the attention of chemists to the preparation of the volatile oil of mustard. They were both led to the same results; they both found that if bruised mustard seed be placed in a still with cold water, that much more essential oil was obtained than if hot water or steam had been employed at once. M. Hesse even advises that the seed should be macerated with cold water for several hours before the distillation is commenced. But hot water or steam are not the only agents that prevent the developement of the essential oil, for it has been shown that acids, alcohol, &c. exercise the same influence.

These facts are of some importance in a therapeutic point of view. In fact, it has been shown that sinapisms, prepared with cold water, are much more active than those made with hot water or vinegar. The researches of MM. Fauré and Hesse have explained this curious anomaly

in part, though it still remains to discover why the developement of the essential oil is greatest with the cold water. It may arise from the hot water and vinegar coagulating the albumen, and thus preventing the extrication of the essential oil, whilst the cold water, by dissolving this substance, removes every obstacle to the formation of the oil.

The discoveries of these chemists have also another practical bearing: thus, in mustard baths, where it is thought advisable to use vinegar or hot water, the flour of mustard should be first mixed with cold water to develop the essential oil, and then the hot water or vinegar added.

*Bull. gen. de Therap.*

*Nitric ether.*—M. L. Piette of Toulouse states that the following method of making nitric ether has always afforded him good results.

Nitric acid at 34°	lbs. ij.
Alcohol 36°	lbs. iiss.

are to be mixed in a mortar and poured into a matrass; this is to be placed on a sand bath, and one end of a large glass tube adapted to it, the other end of the tube being attached to a tin worm passing a refrigerator filled with ice or snow. The apparatus is well luted and heat applied. The ether thus obtained, on being rectified, marks 36°. It should be kept in black bottles.

*Ibid.*

*Formulas for Staining the Hair.*—M. Julia De Fontenelle has given many recipes for this purpose, some of which he states are possessed of very little power, whilst others answer the purpose fully.

*Forestier's Liniment.*

Red wine,	Oj.
Chloride of sodium,	ʒi.
Shoemaker's black dye,	ʒij.

Boil for a few minutes and add oxide of copper, ʒj.

Boil again, and add a sufficient quantity of powdered galls. Evaporate to a honey-like consistence. The hair is to be rubbed with this, and after some time to be washed with pure water.

*Gruling's Dye.*

Boil an ounce of green galls in sufficient quantity of oil till they burst, and then add

Chloride of sodium,	
White wax,	<u>aa</u> ʒij.
Powdered alum,	ʒiij.
Cloves,	ʒj.

Boil and keep in a close vessel in the dark.

These two preparations are by no means equal to the following :

*Paste of Zimara.*

Quicklime,	lbj.
Litharge,	
Lead ashes (sub. oxide,) <i>aa</i>	℥j.

Slack the lime and make a paste of it with the two preparations of lead, and keep in a well closed vessel.

*Paste of Ambrose Pare.*

Quicklime,	℥xij.
Litharge,	℥viiij.
Decoction of sage,	℥xxviiij.

To be well mixed and applied to the hair for four or five hours, which should be previously washed with a solution of alum, and after the removal of the paste, with bran water or the yolk of an egg.

There are many patented compounds for this purpose, the principal of which are :

Quicklime	1 part
White lead or litharge	1
Or, Quicklime	8
White lead	
Litharge	<i>aa</i> 5
Or, Quicklime	2
White lead	2
Talc	1

When either of these are to be used, the hair is to be washed with tepid water, a paste is then to be made with the powder and boiling water, with which the hair is to be thoroughly embued, and the head then covered with an oil-skin cap, taking care that no pressure be used, otherwise the paste will come in contact with the skin of the head and inflame it. Four or five hours afterwards, the cap is to be removed, and the powder adhering to the hair brushed out, which is then to be washed with tepid water, and afterwards with the yolk of an egg. *Jour. de Chim. Med.*

*Liquefaction of hydrosulphuric acid.*—An ingenious method of doing this has been devised by M. Kamp. It consists in introducing dry persulphuret of hydrogen into a closed tube; this body is gradually changed into liquid hydrosulphuric acid, and deposits crystals of sulphur. Hydroiodic acid gas may also be liquified, by introducing into the tube, a little dry iodine and then adding persulphuret of hydrogen, this rapidly dissolves the iodine, and forms a yellowish brown liquid. Now, if by means of a peculiar curvature of the tube, a very small quantity of water be added, a rapid reaction ensues, sulphur is deposited and there is a production of liquid hydroiodic acid. The least trace of water is sufficient to decompose the brown fluid, which is probably composed of hydrogen, iodine

and sulphur. The condensed acid thus formed, boils with the heat of the hand, like the other condensed gases, is of a yellowish colour and resembles liquid chlorine. *Ibid.*

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*Sugar from Indian Corn.*—M. Pallas in a memoir read before the French Institute states that he has ascertained; 1st. That the stalks of Indian corn contain little or no sugar before the flowering season of the plant. 2d. That when the corn is in tassel, crystallized sugar can be obtained from the juice of the stalk. 3d. That twenty or twenty-five days afterwards, whilst the grain is still milky, one per cent. of sugar can be procured. 4th. At a later period, that is, when the grain is completely ripe, but whilst the stalk is still green, the juice will afford two per cent. of crude sugar, and four per cent. of rich and well tasted molasses. 5th. Finally, the residue will serve for food for cattle, and even for the fabrication of common paper. *Journ. de Pharm.*

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*Oil of Caoutchouc.*—Dr. Gregory observes that this oil, discovered by M. Enderby of London, enjoys very remarkable properties. It is volatile, very fluid, and has a very low specific gravity. When pure this is only 0.666 at 60° F. thus scarcely exceeding that of Eupion, which is 0.655. It, however, differs from this substance, as it is acted upon and decomposed by sulphuric acid, whilst Eupion undergoes no change with this acid. The smell is peculiar, somewhat resembling Eupion, but less agreeable and more ethereal. *Ibid.*

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*New apparatus for the preparation of Phosphoric acid.*—M. Brunner of Berne, has described an apparatus for the preparation of phosphoric acid, which is said to answer perfectly. It consists of a large vessel filled with water having a cock at its lower part, and communicating at its upper part, by means of a tube with a funnel reversed on a plate; under the funnel is placed a small capsule of porcelain, containing phosphorus, this is to be set fire to, and the stop cock of the vessel containing the water immediately opened, the water flowing out in a regular stream, causes a current of air which serves to keep up the combustion of the phosphorus, a fresh supply of which is to be introduced occasionally. Not to derange the apparatus, it is better to have a small opening on the sides of the funnel, which will also serve as a passage for the air. *Ibid.*

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*Soap from Flints.*—The common black flint is to be calcined and reduced to powder by wet grinding; this is mixed with caustic soda or potash ley and boiled until saponification takes place. This mixture is to be added to the usual soap materials, after the latter have been boiled to that state, when they have become soap, and are ready to be poured into the frames. The whole is to be well mixed, and the result will be a soap of

excellent quality. The proportions are 40 to 50 of the mixture to 50 of soap materials. *Journ. Frank. Inst. and Lond. Mech. Mag.*

*Rhubarb.*—In a letter addressed by M. Paravey to the Academy of Sciences, on Chinese descriptions of the plants furnishing rhubarb, he states that it is evident from these descriptions and the figures given, that this drug is derived from other species besides the *R. undulatum* and *R. palmatum*. He also says that their books never recommend the Rhubarb in a crude state, and hence use it as a tonic rather than a purgative.

*Journ. de Pharm.*

*Infusion of Rhubarb.*—The roots are to be well contused and placed in a solution of carbonate of potassa in cold distilled water. The vessel should then be introduced into a steam apparatus, and the contents allowed to digest at the temperature of  $189\frac{1}{2}^{\circ}$ . The infusion is to be filtered and after the addition of a certain quantity of cinnamon water, placed in a cool situation. This infusion contains very little starch and will keep longer than when prepared with boiling water. *Rec. Gen. Sci.*

*Extract and Tincture of Rhubarb and Extract of Gentian.*—It is difficult to clarify the aqueous extract of rhubarb. Geisler recommends digesting the entire root of the rhubarb with water, and setting it aside in a close vessel exposed to the action of the steam. The extractive parts dissolve completely, the solution becomes clear, and the root consists only of fibres. The specific gravity of the preparation thus obtained is 2.048, and a pound of *Rheum muscovit.* gives  $8\frac{1}{2}$  ounces of an extract of the consistence of pills. In the same way he has prepared extract of gentian. Six pounds of *Rad. gentian.* gave four pounds of a dark yellow soluble extract. *Records of General Science, Feb. 1836.*

*Emmenagogue Properties of the Aconite.*—Dr. West, of Soultz, extols, in an article in the *Archives Gen.*, August, 1835, the remedial properties of the aconite in amenorrhœa, arising from chronic engorgement or spasmodic condition of the uterus. He administers the aqueous extract, commencing eight days before the expected period of menstruation, in doses of a grain, and gradually augmenting the quantity until eight grains are taken daily at the ordinary day of menstruation. *Amer. Jour. Med. Sci.*

*Fumigations in Hooping Cough.*—Dr. Dohm, of Heide, in the Dutchy of Holstein, has accidentally discovered a remedy for hooping cough that promises to be of considerable use in that too often obstinate and dangerous disease. Two of his own children, a boy and a girl, (the former one, and the latter three, years old,) had been suffering from hooping cough for between two and three months; during which time several remedies,

including belladonna, had been tried in vain. The paroxysms were very frequent and extremely violent, so that the faces and urine used sometimes to be expelled involuntarily. An accident of this kind occurred one evening during the absence of the father; and, to remove the ill smell thereby occasioned, the bed-room was fumigated, and that to such an extent that the child was enveloped in smoke. Contrary to the expectation of the doctor, the child had not another attack that night; the cough became much milder, and the repetition of the same treatment soon cured it. This encouraged him to try it in other cases, and he invariably found the paroxysm greatly relieved by it, if not completely stopped. The fumigation was made with the common *species fumales* of the Pharmacop. Slesvico-Holst. (Olibani libr. duas, Benzoes, Styr. Calamitæ, sing. libr. dimid., Flor. Lavendul., Rosar. rub., singul. unc. quatuor.) He [we think very justly,] considers the benzoin to be the most efficient ingredient.

*British and Foreign Quarterly Review, No. 2.*

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*Hydrochlorate of Quinine.*—Dr. Spielman asserts, that the muriate of quinine is a more speedy and effectual remedy for intermittent fever than the sulphate. It is more soluble also than the latter. The dose is from half a grain to a grain. *Amer. Jour. Med. Sci. Journ. des Conn. Med.*

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*New Vermifuge.*—Mr. Oxley recommends the seeds of the *Quisqualis Indica*, Rumph. (Herb. Amboin. v. 71.) as a vermifuge worthy the attention of the profession. Four or five nuts pounded and given in a little jam or honey, are, he says, a sufficient dose. He has known twenty-nine lumbrici discharged after a single dose.

*Ibid. Trans. Med. and Phys. Society, Calcutta, vol. vii.*

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## **TO CORRESPONDENTS AND SUBSCRIBERS.**

THE present editor of the "AMERICAN JOURNAL OF PHARMACY," in undertaking the duties which have devolved upon him, is not unconscious of the difficulties which have been encountered by the gentlemen who have preceded him in this capacity, and against which he will still have to contend. The zealous and enlightened individuals who first projected and subsequently carried into execution the establishment of a periodical publication, devoted to the diffusion of knowledge upon Pharmacy, Medicine, and the collateral branches of Science, were fully impressed with the necessity of rendering accessible the vast stores of information contained in foreign publications, devoted to similar objects, and also of possessing the means by which native talent and industry might communicate the discoveries and improvements made at home. They foresaw and anticipated the wants of the profession, and may be termed the pioneers of a reform which has commenced within the immediate influence of their operations, and will extend to the extreme limits of our land. The happy result of this anxious desire and well planned endeavour to extend correct knowledge upon all subjects connected with Pharmacy and Medicine, or having a bearing upon them either directly or indirectly, being no longer doubtful, it becomes a matter of honest pride and congratulation to the promoters of this praiseworthy effort, that it has so far been crowned with success; and that it has called forth the approving comments of our transatlantic cotemporaries.

The "Journal of Pharmacy," issued by the authority and under the auspices of the Philadelphia College of Pharmacy, from the stand it has taken abroad and the position it holds in the United States, may be justly entitled to consideration as a National work. Established mainly by the personal efforts of the lamented Dr. BENJAMIN ELLIS and his associates of the College, and since so ably sustained by his successor, Dr. R. E. GRIFFITH, it has continued gradually increasing in reputation and usefulness, and the effects of its influence are becoming daily more apparent. The extension of enlightened views in every department of science and every liberal pursuit, demanding the constant exercise of mental labour and ingenuity, is more appreciated in this country than formerly. A corresponding impulse has been communicated to the profession of Pharmacy; and there is no doubt, that the day will soon be hailed, when there will exist no just foundation for the charge, but recently made against us, "that Pharmacy, which has so greatly contributed to augment chemical discoveries, and to enrich medicine with a host of new remedies, is considered rather as a business than a scientific profession." The agency capable of being exercised by the Journal in hastening this period, will be acknowledged by all; and it is of the utmost importance, in the present crisis of affairs, to sustain it upon the footing which it has already obtained; while at the same time, most vigorous efforts should be made to augment its sphere of influence. A review of its past career affords full encouragement to those who are deeply interested in its success, to look forward to a further increase of the patronage which it has acquired; and the sustaining hand of the public must be extended to render it efficient in furthering the interests of the profession with which it is inseparably connected. The obstacles which have laid in its path have, happily, not

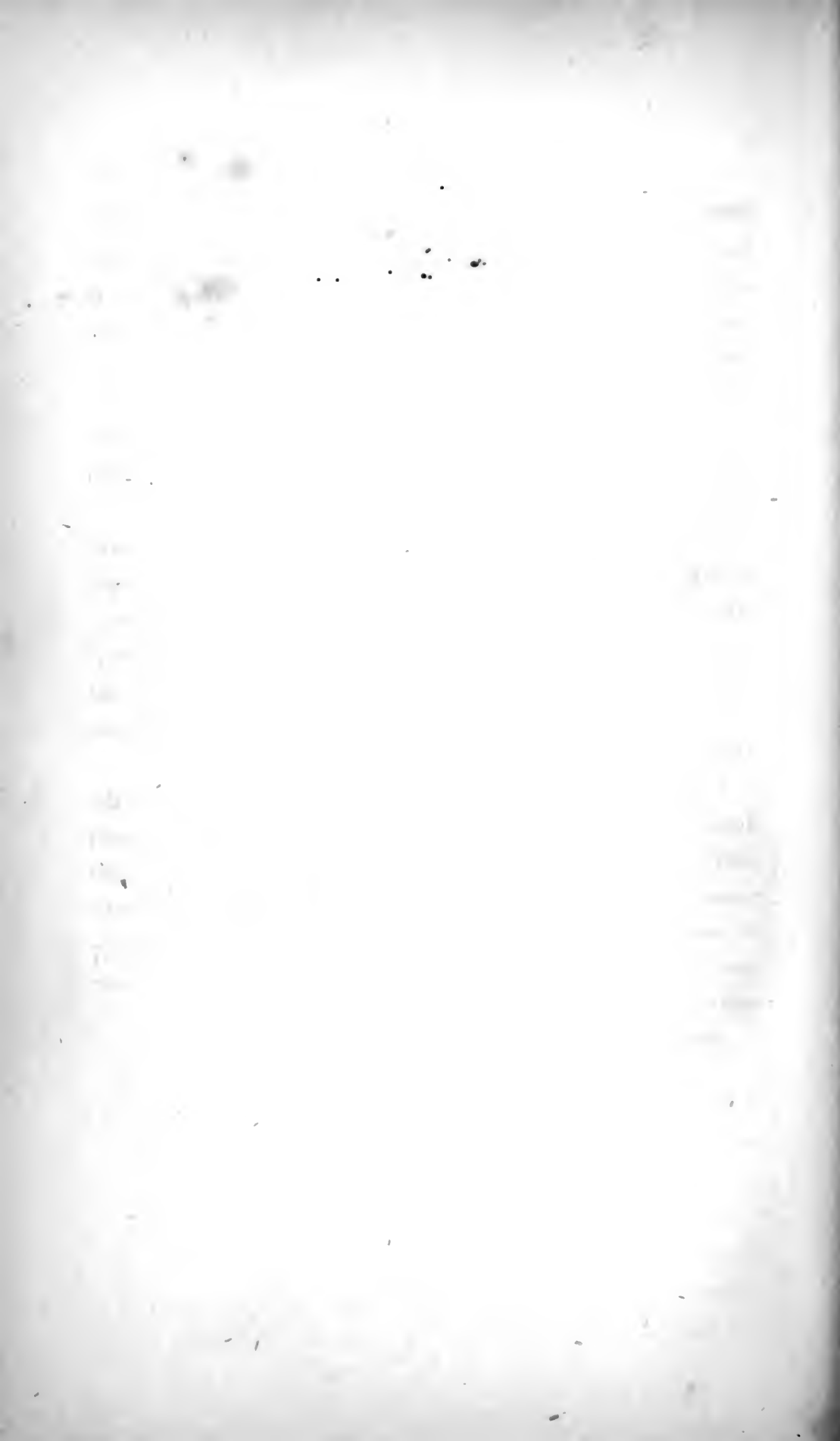
been insuperable, but have yielded to the determined resolution to persevere in the cause of good. What has been accomplished, is but an incentive to increased exertion, which is rendered much more obligatory, from the evidence which exists of the beneficial operation already produced by its continuance.

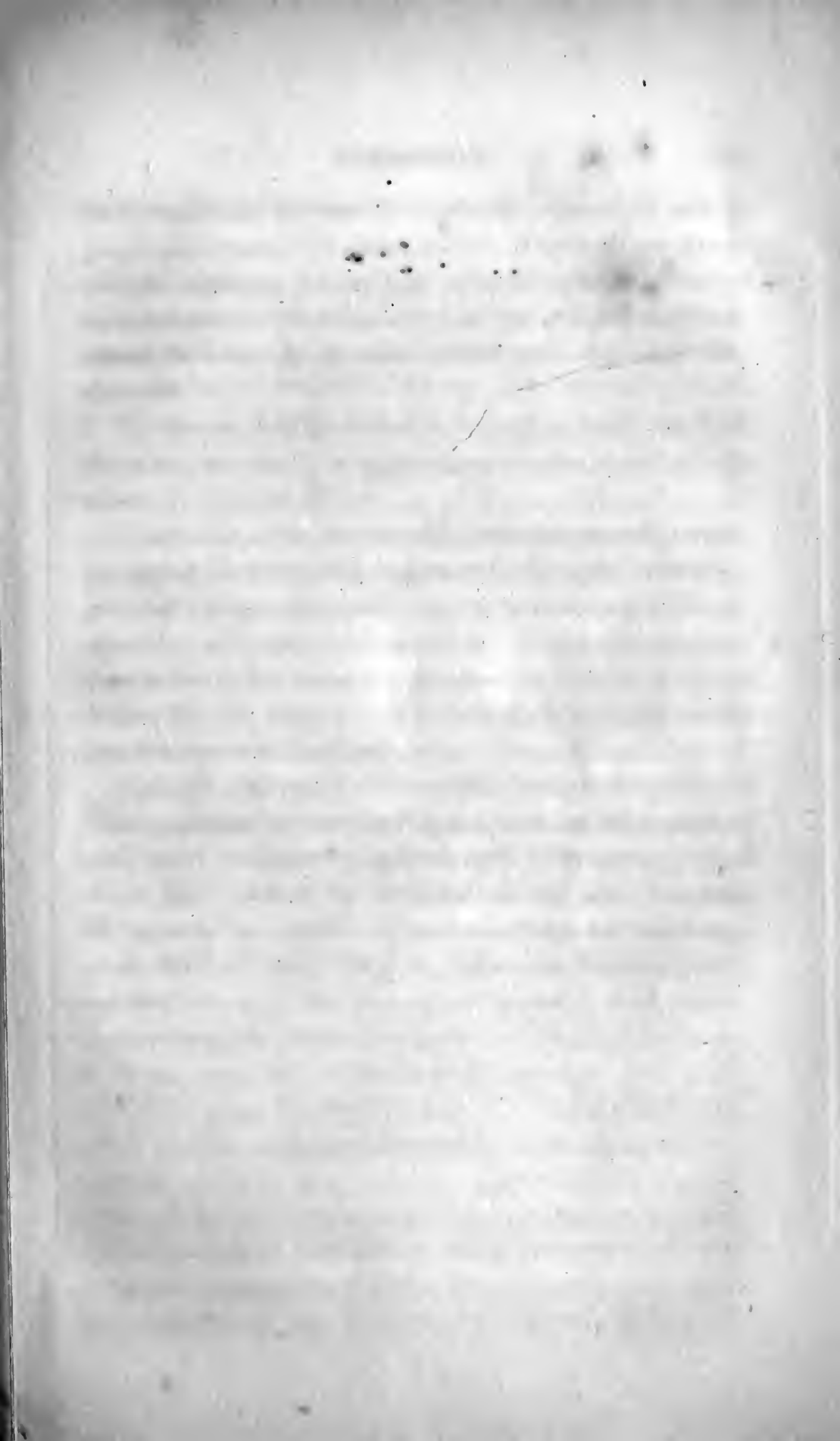
The Journal will be conducted, as far as is practicable, from the nature and supply of matter, upon the plan which has been adopted by the last editor.

To assist us in the support and accomplishment of a work, which has for its ends the improvement of useful knowledge, we now call upon those who have hitherto assisted in the undertaking, and who are capable of affording us aid, to contribute to the endeavour to demonstrate that Americans are not behind the age, either in will or ability, to be ranked among the benefactors of mankind.

Upon the display and full exertion of native talent does the future standing of the Journal, in a great measure, depend; and while no labour or sacrifice will be avoided by those upon whose industry the immediate duty of superintendence is imposed, it is equally important that those who are competent should aid the efforts of the Editor and Publishing Committee.

*January 1st, 1837.*







*Fig. 1*

*Fig. 2.*



T H E  
A M E R I C A N J O U R N A L  
O F  
P H A R M A C Y .

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JANUARY, 1837.

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**ORIGINAL COMMUNICATIONS.**

ART. XLIII.—NOTICE OF A NEW SPECIES OF *LYTTA*.

By JOSEPH CARSON. M. D.

As every addition to the resources of the medical art is important and interesting, from whatever department of nature it may be derived, and whether foreign or indigenous, I am induced to lay before the public an account of a species of *Lytta* which has not hitherto attracted attention. Its introduction will increase the number of individuals belonging to the tribe of insects known to possess vesicating properties, and although hardly to be considered important to the practitioners of the United States—who are so plentifully supplied with its congeners, yet a knowledge of its existence and value may be useful to those who visit the country where it is a native.

*Lytta rufipes*.

*Specific characters.*    *Black with red feet.*

This species can be best compared with *L. atrata* of our own country, from which it differs in size, being rather larger and more elongated, clytra black and polished, smooth, without hair, *feet rufous*, antennae filiform, the length of head and thorax, second joint short, third elongated, as long as the first, rest nearly equal, thorax small.

At the suggestion of my friend, Dr. C. PICKERING, it has been named *L. rufipes* from the colour of its feet.

Fig. 1, in the Plate, represents the dorsal view. Fig. 2, the ventral.

The history of this insect is the following.—A small quantity of them was sent from Valparaiso by Dr. STYLES of that place to Dr. RUSCHENBERGER of the U. S. Navy; he stated in the letter which accompanied them, that he had procured the insect from an apothecary of his town, who assured him that it was peculiar to Chili, and extensively used by the native practitioners to produce vesication; it was also asserted that this effect was fully accomplished in four hours, and that it was attended with more uneasiness than by the common Spanish fly. From some trials which have been made, vesication was fully accomplished at the termination of six hours, which is less by one half than the period usually allowed to the officinal article; but perhaps some portion of activity had been lost from age, as the specimen experimented upon had been kept nearly three years.

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ART. XLIV.—NOTES ON THE SPECIES OF CASSIA WHICH  
YIELD THE SENNA. By JOSEPH CARSON, M. D.

*(Continued from the last.)*

IN continuation of the remarks which were made in the last number, we shall now take up the consideration of such plants as enter into the composition of the Alexandrian Senna, and form component portions of that drug, but which are separate and distinct in botanical affinities from the genus Cassia. From the circumstance of their being either accidentally or designedly associated with it in commerce, all points of their history become matters of interest. It has been the design throughout, to present our statements in a way calculated to exhibit the degree of certainty which had been attained with regard to the species of Cassia already noticed. An appreciation of the difficulties to be encountered in the attempt to arrive at just conclusions, could only be entertained, by contrasting the accounts and descriptions of the authors who have

treated of them; the suggestions thrown out with the view of solving some of the doubts originating from conflicting records, and the mode of reasoning, founded on some of the circumstances which regulate the changes of plants, are not intended to usurp the place of facts. These must speak for themselves, wherever they can be positively ascertained; but in the present instance, it is the want of them, which we have to lament. The subject is still capable of much elucidation, and it is to be desired that the obscure portions of the history of the Sennas, may soon be satisfactorily determined.

The most conspicuous plant which enters as an adulterating article is the Argel; it belongs to the genus *Cynanchum*; it is called *C. argel*, by DELILE, and *C. oleæfolium*, by NECTOUX; prior to the investigations of these botanists it was unknown.

*Cynanchum* is placed by LINDLEY, in the natural Order Asclepiadæ; it formerly was ranged in that of Apocynæ of JUSSIEU; and DELILE describes it as appertaining to this order. Between Apocynæ and Asclepiadæ, a distinction has been drawn by Mr. R. BROWN, founded upon the peculiar character of the reproductive apparatus. In the first mentioned, all the interior parts of the flower within the corolla are distinct; "but in the latter, all of them are consolidated into a single body, the centre of which is occupied by a broad disklike stigma; and the grains of pollen cohere, in the shape of waxy bodies, attached finally to the five corners of this stigma, to which they adhere by the intervention of peculiar glands."

*Cynanchum* presents these peculiarities, as may be observed from its generic description. Calyx 5-toothed, very small and persistent. Corolla rotate. Lepanthium simple, cylindric, five to twenty lobed, surrounding the orifice of the tube. Stamina as in *Asclepias*. Stigmata two. Follicles two. Seed comose.

The species which now interests us is thus characterized:

*C. argel*, caule bipedali, erecto ramoso, foliis lanceolatis glabris.

The stem, which is about three feet high, sends off slender, straight, cylindrical branches; the leaves are opposite, lanceolate, of a pale green hue, supported on short petioles, their

central nerve is prominent; the flowers are white, numerous, and disposed in dichotomous clusters in the axils of the leaves, at the summit of the branches; the calyx of each flower is short, with five divisions; corolla deeply 5-parted, rotate, segments linear and acute; an interior crown, with 5 plicæ and 5 teeth, surrounds the stamens, which, to the number of five, are united in the centre of the flower, so as to form a truncated body elevated upon a pedicel formed by the filaments. The fruit consists of two ovoid pointed foliicles, the exterior substance of which is glabrous, hard, thick, and spotted; they contain imbricate, ovoid, comatose seed.\*

At the time DELILE wrote, the separation of the order Apocynæ had not been made; he therefore was correct in assigning to this plant the affinities of this order. Argel is easily detected in Senna, by its want of agreement with the characteristics of Cassia.

*Periploca græca* is also stated to be introduced into Senna. Its leaves are not a little unlike the Indian article, except that they are destitute of the marked unequal base of the species of Cassia, and have a more brilliant green colour. It belongs as the above to the family Asclepiadæ.

The *Colutea arborescens*, which is said to form sometimes a part of this drug—belongs to the same order Leguminosæ; its leaves are small, rounded and strikingly emarginate, with the base equal, so that no difficulty is presented in detecting it.

*Indian Senna.*—With respect to the plant which furnishes this commercial variety of the drug, considerable doubt and uncertainty still exist, as may be perceived from the accounts which have been given of it. This appears the more extraordinary, as it has been so long known as a medicine and so much dealt in as an article of trade, particularly from India. Among the numerous species of Cassia noticed by ROXBURGH, this has not been alluded to, so far as we can discover; nor does it appear that WALLICK or CAREY, for so long a time residents of the East,

\* DELILE. Description des séné. Memoires sur l'Egypt tome iii.

have paid any particular attention to the subject. We are therefore still left in a measure to conjecture. The plant yielding Indian Senna was for a long time confounded with the first of which we have treated. DELILE suggested that it is the one alluded to by FORSKALL under the title of *lanceolata*; we have however shown reason for supposing that this is his own plant, the *C. acutifolia*, and our opinion is substantiated by the authority of DECANDOLLE. DELILE was led to believe that the *lanceolata* of FORSKALL, was the Indian Senna, from his having procured some of the latter from Arabia, and finding it different, concluded that it had been mistaken for the Alexandrian. Now the description of FORSKALL and the remarks connected with it which were quoted entire, are strong evidence in favour of the opinion that two kinds were known to him, viz. *lanceolata* and another specified in the following words. “Senna Meccae Lohaïæ inveniebatur foliis 5–9 jugis *lineari lanceolatis*,” which distinction does not seem to have been appreciated by DELILE. From the approximation to the descriptions alluded to hereafter, it is extremely probable that this latter is the Indian variety. FORSKALL, moreover, penetrated into Arabia by way of Egypt, so that his mind in the first instance must have been impressed with the characters of the Alexandrian article. M. LIMAIRE LISANCOUR in the year 1821—proposed the specific name *elongata* for the Indian Senna, (*Journal de Pharmacie*) from the elongated shape of its leaflets. It had been noticed by LEMERY and POIRET, who termed it *Sene de la pique*; and in Arabic, it had been known by the designation *Sena lessam asfour*, meaning bird’s tongue, (*lingua avis*.) M. FEE has given a full description of the Indian Senna, and has adopted the name *elongata*, (*Journal de Chemie Med.*;) the account has been introduced into a former number of this Journal, and it is only necessary to refer to it in this place. The characters detailed by the above author strengthen the impression of its being the second variety of FORSKALL.

DECANDOLLE has apparently the same plant in view under the specific name of *C. ligustrinoides*, which he states is confounded in the shops with the *C. lanceolata*.

The conclusions to which we are led from the perusal of the facts and evidence presented by the authorities above cited, are the following:

1. That the *C. acutifolia* of DELILE and *lanceolata* of FORSKALL and NECTOUX are the same.

2. That the *C. ovata* of MERAT and DE LENS is a variety of *lanceolata*.

3. That the *C. elongata*, of LEMAIRE and FEE is the variety alluded to by FORSKALL as having been found in Arabia, and the *C. ligustrinoides* of DECANDOLLE.

A species of *Cassia* has been noticed in Liberia by Dr. SKINNER,\* for several years a resident of that colony, and who has evinced great zeal and industry in his efforts to investigate the Natural History and resources of Western Africa. He has forwarded specimens of the plant to the United States, one of which is deposited in the Herbarium of the Academy of Natural Sciences. From the experiments of Dr. SKINNER we are led to believe that it may become a useful auxiliary in medicine, particularly in the country where it is indigenous. Upon trial its properties were found to be highly purgative, even more so than the officinal Senna; a single leaf (including the stem and leaflets) was sufficient for administration at a dose. The specimen sent is imperfect, consisting but of the leaves and fruit; sufficient however is presented to obtain some idea of the plant.

The leaf consists of 5 pair of opposite folioles, the superior longest, upon short petioles, elliptic,  $3\frac{1}{2}$  inches long and 2 broad, slightly mucronate, smooth and glaucous on the under surface, superior veins prominent giving a reticulated aspect, destitute of glands on the petiole. The fruit is flat, compressed, straight, 3 inches long and half an inch broad; suture prominent, the external surface of the legume marked with numerous ridges, which are at right angles to the suture and extend across the whole legume, corresponding to the seed. Colour dark brown.

From these isolated portions it is to be supposed that the plant is herbaceous and attains some size.

\* A proper name for this species, would be *Cassia skinneri*.

ART. XLV.—A BRIEF SKETCH OF THE PROGRESS AND PRESENT STATE OF PHARMACY IN THE UNITED STATES OF AMERICA. BY WM. R. FISHER, Graduate of Pharmacy, and Associate Member of the Philadelphia College of Pharmacy.

*(Read before the Maryland Academy of Science and Literature.)*

THERE have been, as yet, but few legislative enactments intended to control or direct the exercise of the profession of Pharmacy. Like most other branches of industry in this country, its regulation has been left to the honesty of those who pursue it, and the all controlling influence of public opinion; and the improvements, which have hitherto been made, are attributable chiefly to the latter cause, exercising itself in an increased competition, and the necessary consequence, greater efforts to attract custom, by a more careful attention to the qualities of the medicines, required for family use, as well as neatness and cleanness observed in dispensing them. The business of the apothecary, or druggist and chemist, as he is generally styled, is limited exclusively to the preparation and sale of medicines; and hence, the influence of competition is more directly felt than would otherwise be the case, if he united in his person the more enlarged duties which are undertaken by the class in England under the same denomination.

But notwithstanding the influence of competition in producing the effects above alluded to, the Science of Pharmacy is but illy practised throughout this country. The great temptations which exist, to increase profits by the purchase of cheap articles, and the absence of nearly all legal qualifications necessary to conduct the business, offer sufficient reasons why this department of Medical Science should be so far behind its collateral branches in its practical operations.

It was but recently, that the practice of compounding prescriptions in the office of the physician, existed universally throughout this country, and still does to a great extent, ex-

cept in the large cities. There the necessity for a division of labour is beginning to be felt, and the consequence has been, that several of our cities now possess pharmaceutists as well educated as the duties of their profession require.

Not thirty years ago, the druggist's shop was a mere warehouse or magazine, whence physicians drew their supplies for the purpose of dispensing medicines to their patients; whence paints, glass and varnish were distributed from the same hands, as rhubarb, calomel and magnesia; and whence arsenic and cream of tartar were furnished, wrapped in an undistinguishable manner, each destitute of any mark by which its different character might be recognised. Within that period, a new order of things has, in some places, sprung up;—prescriptions are now compounded with as much skill, accuracy and neatness, as may be found in any other country of the globe; and from the best regulated establishments, nothing is put up or suffered to go out, without a distinct and appropriate label. Another advantageous change has also been effected: Pharmacy, properly so called, has been separated from mere dealing in drugs, and the two classes of retail and wholesale druggists, have become almost entirely distinct. Paints and their concomitants are rarely found exposed for sale in those shops where the practice of dispensing medicines for family consumption is pursued, being entirely incompatible with the order, neatness and cleanliness which have been found requisite to command the confidence and patronage of the public. This happy change, although mainly due to the effect of competition, has been ably, and honourably for those concerned, promoted by the voluntary exertions of the apothecaries themselves, to improve the condition of their business, and raise its standard of estimation with society. Among the means adopted to produce this effect, was the establishment of Colleges of Pharmacy, by which rules are prescribed for the general regulation of their members in the exercise of their profession; and the sciences of Chemistry, Materia Medica, and Botany, taught to the young men engaged in acquiring a knowledge of the business. A degree in Pharmacy was also



established, and the theses which have been offered, have generally been creditable productions, evincing an acquaintance with analytical chemistry, scarcely to have been expected from those whose constant occupation in a laborious and engrossing pursuit, leaves them but little time to devote to the study and practice of this most intricate and delicate scientific research.

Another important aid in this work of reform, has been the establishment of a Journal by the Philadelphia College of Pharmacy, devoted to the publication of original papers and selections on pharmaceutic subjects, and the collateral branches of physical science. This Journal was commenced in 1829. It is published quarterly, and has been well sustained, if a constantly increasing subscription list be any evidence of approval by the public. At the period of its establishment, it was called the "Journal of the Philadelphia College of Pharmacy," but with the commencement of the seventh volume, its scope was enlarged, and the title changed to that of "The American Journal of Pharmacy." It is still published by the Philadelphia College, but a National character is given to it, by the appointment of special collaborators in the chief cities of the Union, from whom many communications of interest have been received. The pages of the Journal, devoted expressly to the use and instruction of the profession, have been constantly filled with original essays and selections, by which the honest apothecary has been aided in his labours, and the devices of the designing sophisticator been detected and exposed. A highly complimentary notice has already been contained in "The British and Foreign Medical Review," and several communications have been transferred from among its contents, to the pages of an able contemporary, the "Journal de Chemie Medicale." It is received in exchange by most, if not all, of the French and German journals, devoted to kindred objects. The most marked and beneficial effects have followed its publication, and important results are anticipated in the improvement of the practice of Pharmacy in this country. This Journal is very generally read and esteemed by

the profession, and may be considered as one of the most important aids in effecting the reform which is rapidly progressing. It may not be amiss to state, that to the industry and ability of the first editor, Dr. Benjamin Ellis, as well as that of his successor, Dr. Griffith, much of the success which has attended its establishment, is due.

With the exception of a law in South Carolina and Georgia, and a similar one in New York (presently to be referred to) requiring, an examination before a board of censors, of those who intend to vend medicines, (and all of which, from some defect, I learn are inoperative;) no laws exist controlling the practice of this profession. Every one is at liberty to undertake the preparation, and dispensation of medicines; and success in business is only to be attained, by neatness and correctness in the individual conducting it. It is to be hoped that public opinion, will ere long direct itself to the employment and encouragement of those, who have especially qualified themselves for the trust, by taking the degree of the College; but as yet too little importance has been attached by the public at large, to the advantages to be derived from a proper study of the profession by those who pursue it. A race of scientific apothecaries is however springing up, and must ere long supersede the mere venders of medicines, who have hitherto had the whole business in their hands. The prices at which medicines are sold, vary considerably in the different cities, and are but poor compensation for an industrious, laborious, and conscientious attention to the duties of an apothecary. It is to be hoped that public opinion will eventually fix the proper estimate upon the value of this species of labour, and afford such a recompense, as will procure the services of well educated, skilful, responsible professors, of this important branch of the healing art.

In this brief sketch of the state of Pharmacy it is impossible to touch upon all the topics connected with it. Those possessing the greatest interest have been already mentioned, and I pass to the consideration of the origin, and progress of the Colleges of Pharmacy of Philadelphia and New York,

which are in a flourishing condition and contributing beneficially to the improvement of the Science.

The Philadelphia College of Pharmacy, established in 1820 by the voluntary association of the apothecaries of that city, numbers now about ninety resident, twenty-five associate, and thirty honorary members. Among the latter are embraced, many of the most distinguished professors of medical and chemical science of the present age, and of all countries. Since the degree of Pharmacy was established in this College, fifty-five graduates have obtained its diploma.

When it is considered that those who obtain this testimony of their competency to practise the profession are solely induced by an honest pride to possess the evidence of their qualifications, and that no interest is directly promoted by it, it must be conceded that at no distant day, this country will possess a corps of distinguished pharmaceutists, competitors for the highest honors of their profession, at present, alas! limited to the self consciousness of being qualified to perform with ability and propriety, what they are called upon by the wants of society to undertake.

The Philadelphia College of Pharmacy is provided with an ample chemical apparatus for the illustration of lectures, a cabinet of specimens of the *Materia Medica*, and a well selected library of medical and chemical books, of the use of which, the pupils of the members are allowed to avail themselves. The only courses of lectures delivered in this institution, have been upon Pharmaceutic Chemistry and the *Materia Medica*.

A chair of Botany was established, but I believe a class was never formed. It is much to be regretted that this science, of such vast importance to the practical pursuit of the profession of pharmacy, has not hitherto been cultivated to the same extent, as the other sciences embraced in the education of a finished pharmaceutist.

To obtain the Diploma of this College it is necessary that the Candidate should have attended two courses of lectures; have written and defended a thesis; have passed an examination by the Professors, and a committee of the Trustees; have

served an apprenticeship with a member of the College of at least four years;\* and have sustained a character of moral worth, industry and intelligence with his preceptor. No advantages or privileges have been extended by the laws, to the members or graduates. Competition exists to an unlimited extent, and fortunately for society has, within a few years, been directed to the improvement of formulas, and the selection of the best qualities of medicines, rather than to its universal tendency, the mere cheapening in price. Many of the preparations of the present National Pharmacopœia owe their origin, or important modifications, in the mode of preparation, to the members or graduates of this College. The College is possessed of a Hall, in which its meetings are held, and Lectures delivered.

Of the College of Pharmacy of the City of New York, I have not been able to obtain so much information.—Its formation was the result of voluntary action and association among the druggists of that city, which was brought about by the same praiseworthy objects, which had induced the establishment of the Philadelphia college.

The charter declares the objects to be “for the purpose of cultivating, improving and making known a knowledge of Pharmacy, its collateral branches of science, and the best mode of preparing medicines and their compounds; and of giving instruction in the same by public lectures.” The Diploma of this college can only be obtained by those who have attended two courses of lectures of the college, and have studied four years with a respectable druggist or apothecary, and

\* It is stated in a “Note upon the state of Pharmacy in the United States” by M. FONTENELLE, contained in a recent number of the *Journal de Chimie Medicale*, that the time of apprenticeship is limited to one year. We would wish our transatlantic friends to understand that this is an error, as will be perceived from the above exposé. It must have arisen from the difficulties under which Don Ramon de la Sagra laboured, in obtaining information upon the subject, viz. those attendant upon an imperfect knowledge of our language. From his book, the information in the note is professedly taken.—ED.

shall have undergone a satisfactory examination by the trustees assisted by the professors. A thesis to be prepared by the candidate himself shall also be deposited with the college. In 1832 the number of members by their printed catalogue, was upwards of seventy, which has doubtlessly increased; but I have no means at hand to ascertain the present number. An effort was made during the last year to raise funds sufficient for the erection of a suitable building, and the purchase of apparatus, &c. in order that the view of its enlightened and philanthropic founders might be carried out. The number of graduates up to March 1835 had been fifteen. By a law of the State of New York passed in 1832, no person after the first of January 1835, is allowed to commence or practise the business of an apothecary in the city of New York, without having qualified himself to obtain the diploma of this college, or having obtained that from some other regularly constituted college of Pharmacy or medicine; or having been examined by the censors of one of the county medical societies, and been furnished by them with a certificate of his qualifications for the business of an apothecary. By another law no person is allowed to sell arsenic, prussic acid, or any other substance usually considered poisonous, without endorsing on it the word Poison, in a conspicuous manner. Tartar emetic is also required to be conspicuously labelled. This is the only law on this subject that I am aware of, in any of the United States.

Among the benefits derived from the labours of these colleges may be stated, that several years since Committees were appointed to investigate the formulæ employed in the preparation of the old English patent medicines, whose labours resulted in the substitution for the vague and various recipes employed, of formulæ based upon a scientific arrangement and disposition of the ingredients; and a suggestion to discard the marvellous details of cures with which the envelopes or directions were laden, substituting in their place a narrative more candid and ingenuous. Reforms are gradually progressing in other branches of the profession, which the former debased state of the art

rendered highly necessary; and the veil of mystery in which all pharmacy was hitherto shaded, is beginning to be raised from the compounds and manipulations of the enlightened American pharmacist. The practice of prescribing medicines for the sick, by the apothecaries where the reform is progressing, seldom occurs. They are not qualified by their education to undertake so responsible a duty; and it is chiefly if not solely limited to those who are actuated by the "*auri sacra fames*," rather than the wish to rely for their support upon the moderate compensation allowed by public opinion, for their services, rendered in the exercise of a liberal profession.

The practice of vending empirical nostrums, or rather that of acting as agents for their inventors, unfortunately exists to too great an extent, even among those whose education and standing should teach them to consider these *opprobria* of the healing art, beneath their notice. In a few establishments a stand has been taken; and it remains to be seen, whether well educated, scientific apothecaries will allow their reputations and standing to become subservient to the avaricious purposes of charlatans and quacks.

In the department of Medical Jurisprudence, the members and graduates of one of our colleges have been representatives of their profession; and it is gratifying to know that a class of young men is rising in the country, competent in chemical proficiency at least, to solve the doubts, which often embarrass the administrators of our criminal laws.

It cannot be expected that this department of medico legal science in its boundless scope should receive many laborers from the pharmacutists of the country; of many of the details necessary for an expert toxicologist they are of course ignorant, nor can they be expected to be found qualified for the investigation of anatomical and physiological phenomena; but so far as nicety and accuracy in chemical research are requisite, or readiness in manipulation indispensable, I hazard the opinion that the graduates of our colleges of Pharmacy may be trusted.

Finally it may be said that like every thing else in this country, the profession of Pharmacy is on the high road of improvement; and that future generations will find established a class of scientific pharmacutists, qualified to meet the exigencies of society in this most important branch of the social economy.

BALTIMORE Nov. 18th 1836.

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ART. XLVI.—MEDICO BOTANICAL NOTICES. NO. XII.

*Cocculus crispus*. An extract prepared from the root of the plant thus denominated, has been brought to this country from China, by Dr. Earle. It has a dark shining appearance, a tarlike consistence and an intensely bitter taste, not unlike the Extract of Colomba, to which it is allied in sensible properties; and the resemblance between them can be readily understood, when the close alliance between the *C. crispus* and the *C. palmatus* is adverted to. This preparation like that from Colomba, possesses tonic and invigorating effects upon the stomach and bowels; and it may also possess some astringency. Dr. Earle informed us, that it had been of late years much employed in India for these purposes. It was given in mild cases of Intermittent fever, and at the termination of Dysenteric and other complaints of the bowels for the purpose of restoring their tone and power. And with the same indications it might be employed in the United States. The dose is from 5 to 10 grains repeated several times daily.

The *Cocculus crispus*, is the *Menispermum tuberculatum* of LAMMARCK, and the *M. verrucosum* of ROXBURGH. It was called *Funis felleus* by RUMPHIUS, and has been transferred by DECANDOLLE to the genus *Cocculus*. The plant is frutescent, smooth, twining, and sarmentose in habit, having a tuberculated stem which gives it a rugged appearance. The

leaves are petiolate, cordiform, acuminate, and glabrous; the flowers are lateral, slender and filiform, in lax spikes.

*Achras sapota.* This plant is also denominated, El Nispero. EMPSON states that it is very abundant in South America, and the fruit is one of the best which the country produces. It is the size of an apple, of an oval figure, the rind brown and somewhat rough; the pulp is white, very sweet and resembles in taste the bergamot pear. It has only three long seeds. The fruit is so wholesome, that it is usually given to the sick to procure an appetite; it is reckoned among the astringents. The tree is large and bushy, and bears fruit during the whole year. The wood is held in great esteem, and is of a tobacco colour inclining to purple. It is capable of receiving a good polish, and is so hard as to be used for pegs, as a substitute for nails to fasten boxes. The leaves of the Nispero are also astringent, and a decoction of them is used for inflammation of the throat. In some parts, they call this tree *Chico Sapote*. The fruit is always eaten raw.

The genus *Achras* belongs to the family Sapoteæ, and Hexandria Monogynia, of LINNÆUS. The seeds of the *A. sapota* is said, by LINDLEY, to be aperient and diuretic. They are endowed with an agreeable aromatic resinous substance, to which these effects are referable. The fruit also, according to JAQUIN, is capable of curing strangury, disury, &c. The plant abounds in a lactescent juice, which, unlike that of other families possessing it, is bland and mild in its properties. From the hardness of the wood it is near to the Ebony tribe, with which it has some botanical affinities.

*Theobroma Cacao.* According to EMPSON, there are two kinds of Cacao, the one wild and bitter, which the Indians used to prize highly, and as it is still in some repute, they endeavour to cultivate and improve it; the other is distinguished by its quality, according to the soil and climate in which it grows. The best Cacao is produced in the province of Secunseo, but the produce there is so small that it barely sup-



plies the people of property in the neighbourhood. The second in point of excellence grows in Guatemala, the third is from Motina, in the same province. Caraccas, Guayaquil, and Europe, are chiefly supplied from thence.

The butter which exudes from the Cacao is very fresh, and is applied to various purposes in medicine.

J. C.

## SELECTED ARTICLES.



ART. XLVII.—ANALYSIS OF THE ROOT OF RHEUM AUSTRALE, CULTIVATED IN THE VICINITY OF PARIS. BY M. OSSIAN HENRY.

THE rhubarb root, which is brought to us by commerce from various localities, and particularly from Tartary, Persia, and China, has been attributed to several species of the genus *Rheum*; whether the plant which furnishes it has really been cultivated in these countries, or whether it is introduced into them by traffic.—Thus, it had been at first supposed that rhubarb was derived from the *Rheum undulatum* and *compactum*; but by M. Guibourt, who has bestowed considerable attention upon its origin, it has been attributed to the *Rheum palmatum*. This opinion seems to be well founded, especially as regards the roots which come from Tartary, and which are known under the name of Russian rhubarb; it is now the belief that a large part of the rhubarb which is obtained from Persia and China, is to be referred to the *Rheum australe*. Many agriculturalists have endeavoured, within a few years, to acclimate in France the different species of Rhubarb, such as the *compactum*, *undulatum*, *rhaponticum* and *palmatum*. There are now establishments in the department of Morhiban at Rheumpole, where this cultivation is still going on; but as the value of the products is less regarded than their quantity, it is to the three first species that attention has been more particularly directed. May it not be from this cause that results so little satisfactory have been as yet obtained? The *Rheum palmatum* has also been the object of different attempts, not altogether unsuccessful, and from the analyses made by M. Guibourt upon the root of this vegetable, it ap-

peared to him that the results had a close analogy with those obtained from an examination of the exotic articles from China and Russia; which is strong corroboration of his opinion with respect to the origin of the latter. As the *Rheum australe* had attracted the attention of naturalists, it was of importance to experiment upon its cultivation in France. M. Merat, a member of the Royal Academy of Medicine and a distinguished physician, has prosecuted this task with peculiar diligence, and was enabled some time back, to present to this learned body many specimens of the recent roots of the *Rheum australe*, raised near Paris.

Having been requested to make an analysis of these roots, I have bestowed especial care upon the undertaking, which, in my estimation, was of importance; and, with the hope that the results will not be uninteresting to pharmacutists, I have determined to publish them.

Before entering upon the subject, I shall present a short notice of the numerous publications upon the rhubarb from China and Russia, by MM. Henry, sen., and Guibourt, Shrader, Brandes, Caventou, Peretti, and finally by Hornemann, whose more recent experiments will be of service to me, in the way of comparison. Upon examining the results obtained by these authors, it will be perceived that they exhibit little agreement; but a reason for the differences between them can be advanced, by supposing that on the one hand the specimens of rhubarb analyzed, had not been identical, and on the other, that the methods of analysis pursued, had not always been the same; hence marked dissimilarity in the isolated products naturally occurred. It is moreover known, that many of these products are complex, and result from the union of several others; it is therefore easily understood why they are more readily separated from each other by one method, than by another; and how it is that in one analysis, it may be the yellow resin which predominates, whilst in another, it may be a bitter substance, or a principle analogous to gum, &c. Sometimes we meet with the oxalate of lime, as one third component of the rhubarb, whilst at others this salt is not de-

tected in larger proportions than 3 or 4 per cent. To these let us add, the necessity which exists of a perfect comprehension of what is meant by the terms, *resin*, *yellow matter*, *bitter of rhubarb*, *rheine*, *rhabarbarin*, *rhabarbarine* and *caphopicrite*, &c., by which the different products are designated.

1st. The *yellow matter*, the *rhabarbarin* and *rheine* appear to be the same substance, in a greater or less degree of purity.

2d. The *bitter resin*, the *bitter of rhubarb*, the *rhabarbarine*, and the *caphopicrite* may easily be confounded, especially, as Caventou observes, if this bitter matter is nothing else than a mixture of the preceding yellow resinous substance and a bitter principle, soluble in water; a compound, which from its properties is no longer similar to the yellow resin, but possesses particular characters.

3d. Furthermore, many experiments detect gum, or a substance which resembles it in character so much, as to lead to the belief, that it is more or less pure, according to the chemists who have obtained it.

4th. Finally—it is lignin, and not pectin, which has been supposed to exist in the insoluble part, and which Hornemann has isolated under the name of *matter extracted by potassa*.

These propositions established, I can now pass to the chemical analysis which I have made of the roots of the *Rheum australe*, cultivated near Paris.

*Examination of the roots of indigenous Rheum australe.*

*Physical Characters.* The recent roots of this vegetable were all extremely healthy, but of a size which evinced that they had not received, either from the age of the vegetable, or from the soil or climate in which they had grown, all the developement manifested by the rhubarb roots met with in commerce. They were only as large as the two fingers,—and of an elongated cylindrical form; of a brown colour externally, and marbled orange-yellow internally; they were surrounded by a thin cortical portion, easily separated; they

possessed a sensibly aromatic smell, and a taste, mucilaginous at first, then bitter, nauseous and astringent, similar to that of common Rhubarb; the saliva was tinged yellow when they had been chewed a few moments.

The roots of which we speak were grated, reduced to small fragments and then dried by a stove to reduce them to a state of pulverization. This powder when well desiccated had nearly the same colour as that of China rhubarb; it was submitted to the following analytical treatment:

*Analysis of the root of the indigenous Rheum australe.*

*Preliminary experiments.* Thirty two grammes were treated to exhaustion by hot alcohol, then by tepid water; the clear liquids mixed and submitted to slow evaporation, became more and more turbid, and when reduced to the consistence of an extract, a brown product was obtained, partly soluble in water and weighing 13.2 grammes. This extract, tested by litmus paper, showed evidence of acidity; it produced the deepest black with the per-salts of Iron, it formed a precipitate with gelatine, and it contained a pretty abundant calcarious salt which must be a supermalate of lime. The portion not acted upon by alcohol and water contained the oxalate of lime, traces of the sulphate and phosphate of the same base, a little iron, and lastly lignin and pectin.

The powder, subjected in a crucible to a moderate heat, soon emitted a yellow aromatic vapour, which collected in the mouth of a funnel, and attached itself in the form of a yellow powder, easily fusible at a high temperature into a kind of brown oily liquid. This is the substance which constitutes the colouring matter of the rhubarb.

*Analytic experiments.* 1. One hundred parts of the powdered indigenous rhubarb were treated without heat in the apparatus for displacement by pure sulphuric ether, until this menstruum ceased to become yellow. After the distillation of the ethereal tincture, continued until three fourths had passed over, there remained a deep brownish yellow liquid, which

placed under the receiver of an air pump, left a deep yellow residuum in the form of lamellæ, or of minute scales having a crystalline aspect.

This residue weighed 7.3 grammes, it constituted the yellow matter, or the *yellow resin*, the *rhubarbarine* or *rheine*, of some chemists.

*Traces of rheine with fixed oil.* This product dissolved in boiling water, became turbid when cooled, and formed a yellow powder. It volatilized in the form of vapour, or aromatic yellow fumes, its taste was styptic, pungent rather than bitter; dissolved in sulphuric ether or alcohol, it produced golden yellow solutions, and left upon blotting paper a stain which could not be totally removed by heat, and which was due to a small quantity of *fixed oil*.

*Note.* I am at a loss to know if there exists with the colouring matter a volatile oil, which gives it the aromatic odour; or whether this odour belongs really to the rheine itself.

This yellow matter is but slightly soluble in sulphuric, acetic, and muriatic acids. Treated by boiling nitric acid, it undergoes alteration, and produces a brownish yellow substance, which contains no oxalic acid, and is but partially soluble in water. The action of soda, potassa, and ammonia upon rheine is marked; they dissolve it, and afford solutions of a beautiful reddish purple colour, which probably may be useful in dyeing. If these purple solutions are saturated with an acid, the liquid assumes a yellow colour, thickens, and throws down yellow flocculi.

The aqueous solutions of rheine produce with

Hydrochlorate of baryta	a yellowish precipitate,
Acetate of lead	a rose coloured precipitate,
Per-muriate of iron	a black colour,
Protochloride of tin	a yellowish white deposit,
Alum	a yellow tint.

2. After the treatment by ether, I submitted the powder to the action of alcohol and pure cold water. In the second in-

stance, the vegetable substance was considerably swelled, and its appearance became gelatinous. When the liquors had been strained, which required considerable time, on account of the viscosity of the magma, I united the whole and evaporated with care; during the operation there was separated a brown pulverulent substance, hardly soluble in water, which, separated by the filter and dried, weighed 5 grammes; and which when examined, was found to contain tannin; this I believe to be what Hornemann has named *apotheme de tannin*.

*Apothema of tannin*, (oxygenized extractive). The clear liquor was concentrated at 100° upon a disk, to an almost dry extract, and as friable as possible; this extract was acid; submitted to alcohol at 35°, it separated into two portions; one of them which was flocculose, contained some traces of *apothema*, and of supermalate of lime, together with a mucilagenous substance which has been called *gum*; this combination weighed 1.6 grammes; the other soluble in the alcohol, contained a little tannin, and probably gallic acid, besides a bitter nauseous brown matter, which being as much dried as practicable, weighed 14 grammes; this is what has been designated by the names *caphopierite*, and *rhabarbarine*, a complex product, as has been supposed by M. Caventou; in it exists rheine associated with one or more substances. To isolate that colouring part of the resin which constitutes this kind of combination, I have treated it several times over with an alkaline solution. The menstruum at first became reddish purple, and threw down a dirty brown flocculent deposit, soluble almost entirely in boiling alcohol, but the amount of it was exceedingly small. I may state moreover, that when the alkaline liquids are not too weak, the mixture produces an entire solution.

*Sugar?* I believe that there also exist traces of sugar in rhubarb, for the part which contains the caphopierite, exhibited upon admixture with yeast, the appearance of fermentation.

3. I submitted to the action of boiling water, the root exhausted by the preceding operations, while it was still soft; the liquor when filtered had little colour; it evinced, when tested

by iodine, the presence of a considerable quantity of *amidon*; upon precipitating this liquor when concentrated, by alcohol, it was separated into a flocculent magma, which when dry, was not pulverulent, but existed in the form of a gummy coating, and weighed about 2 grammes: the amylaceous matter doubtless had been modified in this operation.

4. It only remained to investigate the composition of the insoluble residue, in which I had already ascertained the existence of oxalate of lime and of phosphate and sulphate of the same, besides lignin or ligneous fibre, and pectin, with pectic acid. I separated this insoluble residue, which was dry, coriaceous and brown, into two equal portions, A and B.

*Operation A.*—The coriaceous matter, calcined strongly in a platina crucible, gave off empyreumatic fumes, associated with products slightly azotized. The residue of this prolonged calcination was of a dirty white colour; treated with diluted muriatic acid, a rapid disengagement of carbonic acid took place, mixed with traces of hydrosulphuric acid, due to the small quantity of sulphate which the carbon had decomposed; the liquor being filtered and neutralized by an excess of ammonia, let fall a precipitate of phosphate of lime, and oxide of iron 0.25; filtered anew and oxalate of ammonia being added, an oxalate of lime was obtained, which when dry, weighed 5.3 grammes, the weight being doubled, since but half the coriaceous residue was used.

*Operation B.*—In order to convince myself of the presence of oxalic acid in the organic salt which the heat had decomposed in the preceding experiment, I reduced the coriaceous deposit into a sort of pap, by means of hot distilled water. I then mixed it with a small quantity of bicarbonate of potassa, and heated it to boiling. The mixture when filtered, produced a rose-coloured liquid, from which the addition of an acid separated gelatinous flocculi of pectic acid; filtered anew, the neutral acetate of lead was added to the liquid portion. The white precipitate being washed and treated in a capsule by sulphuric acid, produced, after several days, crystals of oxalic acid, easily to be recognised and most unequivocal.

With regard to the insoluble gelatinous residue, when dry



it weighed 21.3 grammes and must be formed entirely of ligneous fibre.

If we now compare these results with those presented by Hornemann, with respect to the exotic rhubarbs of China and Russia, we shall have the following table:

*Comparative Table of the Analyses of Indigenous and Exotic Rhubarb.*

<i>Root of the Rheum australe.</i> By O. Henry.	<i>Quantity</i>	<i>Russian Rhubarb.</i> By Hornemann.	<i>Quantity</i>	<i>China Rhubarb.</i> By Hornemann.	<i>Quantity</i>
	<i>Gramm.</i>		<i>Gramm.</i>	<i>Gramm.</i>	<i>Gramm.</i>
Rheine, (rhabarbarin, yellow matter.)	7.30	Yellow matter.	9.58	do.	9.16
Fixed oil, traces, bitter of rhubarb, (caphopieite, rhabarbarine.)	14.	Bitter matter.	16.04	"	24.75
Apothema of tannin.	5.00	Apothema of tannin.	1.45	"	1.25
Extract with tannin and gallic acid.		Extract with tannin.	14.	"	16.45
Gum or mucilaginous matter.	1.60	Gum.	10.	"	
Supermalate of lime.					
Sugar, traces.					
Amidon.	2.				
Oxalate of lime.	3.30	Oxalate of lime.	2.04	"	1.30
Phosphat. } lime					
Sulphat. } .50					
Oxide of iron.					
Pectin and Pectic Acid.*	46.				
Ligneous fibre.		Matter extracted by potassa.	28.3	"	30.41
Moisture.	20.30	Ligneous fibre.	13.58	"	15.41
Vegetable Albumen.		Humidity; loss.	4.38	"	3.73
Total,	100.00	Total,	100.00	Total,	100.00

\* If this substance predominates much, it is owing, probably, to the less degree of development of the root; whilst in the exotic plant, it has, from its more mature age, been changed in part to oxalic acid.



*Recapitulation.* It will be seen from an examination of this table, that the analysis of the indigenous rhubarb, has some analogies with that of the exotic articles, especially if the fact be taken into consideration, of the little developement attained by the vegetable in the first attempts at cultivation, which have been made in a soil and climate as yet little congenial to it. By an examination also of the analyses of MM. Henry, sen. and Guibourt, and by recollecting the great proportion of amidon and oxalate of lime, which in the process of vegetation have taken the place of the larger part of the pectic acid, found by myself, we arrive at a similar approximation; furthermore, the relation between the amount of the bitter matter, the tannin, the supermalate of lime &c. and the corresponding substances in the analysis alluded to, is also extremely close. We have then reason to hope, that the cultivation of the Rheum australe will be attended with good results from new attempts and well directed attention. Its naturalization ought to become advantageous, as well in a medical, as in an economical point of view, since it is ascertained that, in England and India, the colouring matter of the rhubarb root is used in dyeing. We much desire that M. Merat, and others who are employed in the effort to introduce exotic vegetables would turn their attention to this important plant.

ART. XLVIII.—ON THE BLEACHING COMPOUNDS OF CHLORINE. By M. MARTINS, professor of chemistry, University of Louvain.

[*Translated by William W. Smith.*]

In January 1834, I addressed to the Royal Academy of Sciences and Belles-Lettres of Brussels, a memoir on the soluble chlorides of oxides, in which, after having discussed the relative worth of several processes recommended for the preparation of chlorate of potassa,\* I endeavoured to prove that the bleaching chlorides of oxides ought to be considered simple compounds of chlorine with oxibases.

A short time after, M. Balard of Montpellier having also investigated the composition of these chlorides, arrived at results which induced him to conclude that these compounds were mixtures of metallic chlorides and hypochlorites, salts of an oxacid of chlorine, to which the chlorides owed their distinguishing properties. This was a confirmation of the opinion first advanced by Berzelius, and adopted by many celebrated chemists. This opinion was at first only founded on the analogy thought to exist between the reactions of chlorine and sulphur with the alkaline oxides, and among the experiments adduced by Berzelius in support of it, there is not one which cannot be as well explained by the old theory according to which these compounds are unstable combinations of chlorine with metallic oxides. This I think was proved in

\* I then proved that the formation of chlorate of potassa, by passing a stream of chlorine through a concentrated solution of caustic potassa, was merely the result of a spontaneous decomposition of the chloride of potassa previously formed, a decomposition to be attributed solely to the insolubility of the chlorate resulting from it; and that when it is wished to prepare chlorate of potassa by double decomposition from chloride of lime, and chloride of potassium, the chloride of lime should not (as Liebig has recommended) be heated until it loses all its bleaching power; for by this process two thirds of the chloride of lime, would be converted into chloride of calcium, which can have no agency in the production of the chlorate.

my memoir already alluded to;\* in it I showed that the properties of the chlorides of oxides could be even more satisfactorily explained by the old, than by the new hypothesis. The latter has since acquired much weight from the experiments of Balard, which rendered it more probable, and seemed to have overthrown all the arguments I had brought forward, in support of the old theory of the composition of these chlorides. At that time it appeared, that Berzelius' theory would be pronounced the true one and be adopted by all chemists. But by a repetition of Balard's experiments and an extension of my first work on the compound which chlorous acid† forms with alkaline oxides, I convinced myself that the consequences which Balard has deduced from his experiments, as to the composition of the bleaching chlorides, are not exact, and that they should still be considered simple compounds of chloride with metallic oxides. In order to elucidate the question, I will divide my memoir into three parts. In the first, I will give a brief sketch of the oxygenized compounds of chlorine; in the second, I will point out the principal properties of the chlorites, and the manner of preparing them; in the third, I shall treat of the hypochlorites in their relations with the chlorides of oxides, and will show that these salts, as well as the chlorites, are entirely distinct from the bleaching chlorides.

### I. *Sketch of the Oxacids of Chlorine.*

We are indebted to the last works of Balard for a knowledge of four definite compounds of chlorine and oxygen, all of which are acid, and may be compared in composition to the oxacids of sulphur; for we have

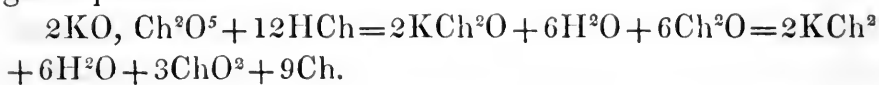
Hypochlorous acid	$\text{Ch}^2 \text{O}$	Hyposulphurous acid	$\text{S}^2 \text{O}^2$
Chlorous acid	$\text{Ch} \text{O}^2$	Sulphurous acid	$\text{S} \text{O}^2$
Chloric acid	$\text{Ch}^2 \text{O}^5$	Hyposulphuric acid	$\text{S}^2 \text{O}^5$
Perchloric acid	$\text{Ch}^2 \text{O}^7$	Sulphuric acid	$\text{S} \text{O}^3$

Hypochlorous acid, although offering the same composition

\* Published in volume 10 of the Prize Memoirs of the Royal Academy of Brussels.

† The bioxide of chloride of some chemists.

as the pretended protoxide of chlorine of some chemists, is a very dissimilar compound, as Balard has proved beyond all doubt. As to the protoxide of chlorine discovered by Davy, it is no more than a mixture of chlorine and chlorous acid; which is proved by the action of water and protochloride of mercury on it, these agents separating the two mixed gases; and also by the unusual contraction of one sixth of the volume of its component gases, which this compound would offer. The following formula will express the reaction by which the gas is produced:



Thus the pretended protoxide of chlorine, resulting from the reaction of chlorohydric acid on chlorate of potassa, may be considered nothing more than a uniform mixture of one volume of chlorous acid gas  $\text{ChO}^2$  and three volumes of chlorine. This supposition accounts not only for the constancy of the composition of the protoxide, (which has led many to consider it a definite compound,) but also for the contraction of one sixth of the total volume of its constituent gases, for in a volume of chlorous acid gas, there is a contraction of one third of the volumes of its component gases; therefore in an invariable mixture of a volume of this gas with three volumes of chlorine, there should be a contraction of one sixth of the total volume. This contraction confirms what the experiments of Soubeiran had already proved, that Davy's protoxide of chlorine was but a mixture of chlorine and chlorous acid gas. The second oxygenized compound of chlorine, that which is procured by the action of sulphuric acid on chlorate of potassa, by the process of Count Stadion, is also evidently an acid; 1st, because it neutralizes completely the soluble alkaline oxides; and 2d, because, according to the electro-chemical theory, it is impossible that an oxide of chlorine, more highly oxygenized than hypochlorous acid, can possess the properties of an acid in an inferior degree to it. We will therefore continue to call this gas chlorous acid, and its salts with basic oxides, chlorites.

Chloric acid may be compared to the hypophosphoric and hyposulphuric acids. It should be called hypochloric acid, reserving that of chloric acid, (conformably to the rules of the nomenclature,) to the most highly oxygenized, and, at the same time, most stable of these compounds of chlorine, now improperly called perchloric acid. In fact, as hyposulphuric acid is decomposed into sulphurous and sulphuric acid, so chloric acid, by heat or even by keeping a long time at the ordinary temperature, is converted into chlorous and perchloric acids; a very slight increase of temperature suffices to develop in it a strong odour of chlorous acid gas and a yellow colour, owing to the solution of the gas in the remaining liquid. The analogy between the oxacids of chlorine and those of sulphur would be perfect, were the composition of perchloric acid  $\text{Ch}^2\text{O}^6$ , as M. Gay Lussac at first concluded from the reaction which produced it. All the phenomena attendant on the production and action of this acid, can be more satisfactorily explained, by supposing its atomic composition to be  $\text{Ch}^2\text{O}^6$ . A repetition of the analysis of this acid compound would be interesting, as it does not appear to have been made with the rigour calculated to inspire entire confidence.\*

## II. *Of the Chlorites.*

The chlorites, or more or less neutral compounds of chlorous acid with basic oxides, and of which I first proved the existence in my paper already referred to, are salts of little stability, as might be expected, as well from the weak acid properties of their acid, as from its instability. They are more stable than Balard's hypochlorites, and are not decom-

\* According to the analysis of Count Stadion, perchlorate of potassa loses 44 per cent. by its decomposition. Now, if we suppose the composition of its acid to be  $\text{Ch}^2\text{O}^7$ , it should lose 46.18 per cent.; and, on the other hand, it should lose 42.88 per cent., allowing it to be composed of  $\text{Ch}^2\text{O}^6$ . The latter number approaches nearer to the analytical result, especially when we take into consideration the fact that some undecomposed salt is carried over by the evolution of the gas, as was observed by the Count.

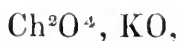
posed by slight elevations of temperature; they give precipitates with nitrate of silver; they give off chlorous acid gas with brisk effervescence, when treated by the mineral acids and by some organic acids; this is their characteristic property. Those which I have examined are all soluble in water; they are the salts of potassa, soda, baryta and lime. They may be procured without difficulty, by passing a current of the gas (generated by Count Stadion's process) through solutions of the first three bases, and through a milk of lime. By continuing the operation until the liquid ceases to absorb the gas, solutions are obtained which are perfectly neutral, possess great bleaching power, and are decomposed with evolution of chlorous acid gas, by the addition of even a diluted acid. The products thus obtained, were thought by Berzelius to be solutions of a mixture of chlorides and chlorates; but, if we make a strong solution of a chloride and chlorate, and saturate it even with chlorous acid, and then treat it with an acid, no appreciable quantity of chlorous acid is evolved: a proof that the solutions procured as above are really compounds of chlorous acid and alkaline bases. It was thought that chlorites did not exist, because during the saturation of a concentrated solution of potassa by chlorous acid, a large quantity of chlorate of potassa subsides, and chloride of potassium remains dissolved. But these salts are formed only when the solution is charged to a certain degree with the chlorite, and their formation is the result of the insolubility of the chlorate in the quantity of liquid operated on; for it does not take place when we saturate a milk of lime, or a solution of one part of potassa in thirty of water, with chlorous acid. We can obtain a more concentrated solution of chloride of potassa than of chlorite of potassa, because the spontaneous decomposition of the latter gives rise to a proportionally greater quantity of chlorate, as will be seen hereafter. As the chlorate of soda is much more soluble than that of potassa, we should be able to obtain a stronger solution of the chlorite of soda than of that of potassa, which is the case; for, having passed chlorous acid gas into a solution of one part of soda in five or six of water, until the



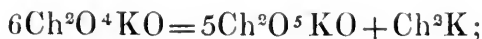
gas was no longer absorbed, I obtained a neutral, bleaching liquid, from which no salt was deposited, and which contained such a quantity of chlorite, that a few drops of it into which was poured a drop of sulphuric acid, evolved so much chlorous acid gas, as to produce a powerful explosion by its decomposition. There exist both neutral and alkaline chlorites. When we pass chlorous acid gas into an alkaline solution, it is at first absorbed without colouring the liquid, which retains its alkalinity, and from which, though very concentrated, no chlorate is deposited. This alkaline chlorite does not bleach without the intervention of acids which evolve from it much chlorous acid. Its solution may be concentrated in vacuo, or by a gentle heat, without being decomposed, and the salt obtained in a solid state. I have even procured the chlorite of potassa in the form of delicate lamellar crystals, resembling the chlorate, but distinguished from it by the effervescence (due to the escape of oxide of chlorine) produced by the action of sulphuric acid, diluted with ten times its weight of water; an acid which does not decompose the chlorate. The solution of this chlorite may be preserved any length of time, if kept from the air; in a solid state the salt may be exposed to the air without decomposition, provided the atmosphere is not sufficiently moist to cause deliquescence, and thence absorption of carbonic acid.

When chlorous acid gas is passed into a solution of alkaline chlorite of potassa, or a solution of potassa, until it is no longer absorbed, there is a point when the liquid commences to be coloured; at that time it loses its alkalinity, and soon deposits a large quantity of chlorate of potassa, provided the solution be strong and the gas continues to pass into it; but if the solution be weak, we have a neutral bleaching chlorite without formation of chlorate. This neutral solution is capable of absorbing an additional quantity of chlorous acid, and becomes of a dark yellowish brown colour; but by exposure to the air, or to a temperature of  $80^{\circ}$  Cen., it loses this excess of acid: this temperature, if prolonged, decomposes all the chlorite with formation of chlorate and chloride.

As the solution of neutral chlorite of potassa cannot be concentrated without decomposition, its spontaneous evaporation should produce formation of chlorate and chloride. In fact by allowing it to evaporate at the common temperature, under a large receiver in the presence of quicklime, I obtained a residue of chlorate and chloride nearly in the ratio of six parts of the former, to one of the latter, which induces me to believe that the neutral chlorite of potassa, has the following composition:

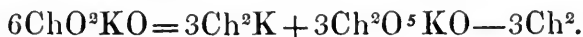


whence



a formula which represents the results, and shows that for each atom of chloride, there are five of chlorate formed; the increase of the result of the decomposition of the chlorides of oxides. All the neutral chlorites that I have examined, submitted to evaporation in the manner above described, leave a residue destitute of bleaching power, fusing on a live coal, and evolving chlorous acid only by the addition of concentrated sulphuric acid.

We can now understand why the alkaline chlorites are more stable than the neutral; their composition is such that they cannot produce chlorates and chlorides; for we have:



It is no doubt for the same reason that we can evaporate the alkaline chlorides of potassa and soda *to dryness* without the production of chlorates and chlorides, which are always formed by the concentration of the neutral chlorides or those which do not change reddened litmus paper to blue, or precipitate a solution of corrosive sublimate. I have shown that we can by evaporating alkaline chloride of potassa even at 50° Cen., obtain a dry, amorphous compound, which bleaches powerfully, and evolves much chlorine by the addition of the weakest acids. We thus see how many chemists have, by rapid evaporation, succeeded in obtaining a solid chloride of soda, while others have always failed in the attempt; the

former employed an alkaline chloride, the latter a neutral chloride.

The solution of chlorites with excess of chlorous acid, become after a certain time acid, and contain free chloric acid, the result of the decomposition of the free chlorous acid, which in the presence of water is converted into chlorine and chloric acid.

The neutral chlorites in solution, are partially decomposed by carbonic acid; which shows the feeble affinity of chlorous acid for bases. The decomposition however, is never complete, even when the gas is passed into a solution of chlorite of lime. The solution soon becomes coloured by free chlorous acid, which may be driven off by continuing the stream of gas a sufficient length of time; the acid being expelled, the solution loses its colour; after which carbonic acid has no action on it; the presence of undecomposed chlorite in the liquid, is easily proved by the addition of sulphuric acid, when a large quantity of acid is given off. It is probable then, that carbonic acid merely converts the neutral into alkaline chlorites, or into carbonato-chlorites.

The neutral chlorites bleach; in common with chlorine and the chlorides of oxides, their oxidizing power is great, converting sulphuret of lead instantaneously into sulphate of lead. When distilled at the temperature of their boiling points, they give off a little chlorous acid, and leave as residue a mixture of chlorate and chloride containing free alkali; owing, probably, to the escape of chlorous acid, or which may have existed in the liquid, although it could not be detected by litmus paper in the bleaching solution of chlorite.

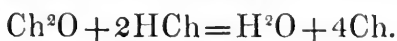
A mixture of chlorite and chloride in solution, gives off chlorous acid when decomposed by an acid; which distinguishes it from the chlorides of oxides—which, under the same circumstances, give off chlorine; the latter are not, then, as was supposed, mixtures of chlorites and chlorides.

### III. *Of the Hypochlorites.*

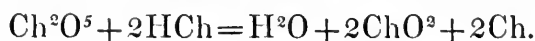
The hypochlorites discovered by Balard, bleach and oxidize like the chlorites; when neutral, they possess little sta-

bility; the least increase of temperature suffices to decompose them into chlorates and chlorides, oxygen gas being given off, according to Balard; when alkaline, their solutions may be evaporated without being decomposed.

They can easily be distinguished from the chlorites, by the facts, that when treated by acids they give off hypochlorous acid, either pure or mixed with chlorine, and that when previously mixed with a metallic chloride, chlorine alone is liberated from them by the action of acids; which is owing to the mutual decomposition of hydrochlorous and hydrochloric acids, as expressed by the following formula:



The same result is not observed when mixtures of chlorites and chlorides are treated in the same manner, because hydrochloric acid has no action on chlorous acid. An analogous result is presented us in the action of acids on a mixture of chlorides and chlorates, by which chlorous acid, mixed with its own volume of chlorine, is evolved with effervescence, even at ordinary temperature; this reaction of hydrochloric and chloric acids, is expressed by the following formula:



So that the product is a mixture of equal volumes of chlorous acid and chlorine, and not water and chlorine, as generally stated. This reaction greatly facilitates the decomposition of these salts by acids; for sulphuric acid, diluted with its own volume of water, which at the ordinary temperature has no action either on the chlorate of potassa or the chloride of potassium, decomposes them with ease when mixed as stated above. For the same reason, a mixture of iodide of potassium and iodate of potassa is decomposed by the feeblest acids, even by carbonic acid, with precipitation of iodine, as observed by Gay Lussac, the hydriodic and iodic acids mutually decomposing each other.

This property, which the hypochlorites possess, of giving off chlorine by the action of acids when previously mixed with metallic chlorides, has contributed in no small degree to strengthen the opinion, that the chlorides of oxides are mix-

tures of chlorides and hypochlorites, and that it is to the latter they owe their principal properties. But this result should no more induce us to suppose so, than the precipitation of iodine by a weak acid, from a mixture of iodide of potassium and iodate of potassa, should authorize us to confound a colourless solution of such a mixture, with an iodide of oxide distinguished from it by colour independent of other properties.

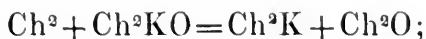
The hypochlorites even when mixed with metallic chlorides, may easily be distinguished from the chlorides of oxides, by their easy decomposition with evolution of oxygen, when heated even slightly;\* this gas is never given off when chloride of potassa is boiled. The latter supports without decomposition a temperature of 50° or 60° Cen., and if it does not contain an excess of chlorine, it may even be heated beyond 80° Cen. without alteration. The hypochlorites have little stability, and in summer a few days suffice for their spontaneous decomposition; the chlorides of potassa and soda on the contrary may be preserved a long time if kept from the air and light.

The chlorides of potassa and soda, with excess of chlorine, prepared by passing chlorine through the alkaline solutions until it is no longer absorbed, possess a remarkable property which has not yet been noticed, and which cannot well be explained on the supposition of their being mixtures of chlorides and hypochlorites. When their solutions are boiled in a distillatory apparatus, they are decomposed, do not evolve oxygen or even a notable quantity of chlorine, but hypochlorous acid, which with the vapour of water is condensed in the receiver. This liquid possesses all the properties of Balard's hypochlorous acid; it has the same odour; bleaches, decomposes oxalic acid at low temperatures, with evolution of carbonic acid, liberates chlorine from chloride of sodium, and has the same action on iron filings as Balard's acid. The products of the distillation should be divided; the liquid first condensed, appears to contain free chlorine; the liquid whose properties I have just stated, is next obtained. The process should be

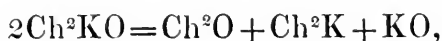
\* Balard, *Ann. de chi. et de phys.* vol. 57. p. 299.

discontinued when the chloride of oxide is reduced to half its previous volume, the residue being then a mixture of neutral metallic chloride, with a small quantity of chlorate, the formation of which appears to me accidental.

When on the other hand, chloride of lime or the neutral chlorides of potassa and soda prepared from chloride of lime by double decomposition are distilled, the product is water, containing barely appreciable traces of hypochlorous acid or chlorine. The following formulæ express this difference in the results:



Thus the excess of chlorine by its affinity for oxygen, may favour the decomposition of the chloride of oxide, which always has a tendency to transform itself into metallic chloride and hypochlorous acid. Without the free chlorine, we could not account for the formation of hypochlorous acid; for we have,



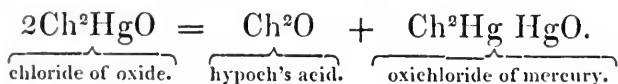
which does not express the reaction, because the residue of the distillation is not alkaline, as it should be, were the formula correct.

It is scarcely possible to explain the phenomena of the distillation of the chlorides of potassa and soda with excess of chlorine, by Balard's hypothesis; for according to it, we must suppose that the free chlorine first decomposes the hypochlorite and then reacts on the oxide thus set free, so as to form with it a metallic chloride, and hypochlorous acid, a complicated and scarcely admissible reaction.

We know too that when liquid hypochlorous acid is poured on a metallic chloride of the first section, the chloride of sodium for instance, it is decomposed with effervescence due to the escape of chlorine and there remains a bleaching chloride of soda, similar to that prepared in the ordinary way. This reaction is readily explained by the following formula:



But those who admit that the chlorides of oxides are mixtures of metallic chlorides and hypochlorites, should believe with Balard,\* that hypochlorous acid is capable of decomposing the chlorides of the alkaline earths, with formation of a mixture of chloride and hypochlorite. Now, it is difficult to suppose that this acid is able to convert such fixed compounds as these chlorides into others so unstable as the hypochlorites. Besides, Balard† has observed that hypochlorous acid does not combine with peroxide of iron, while Grouvelle has announced a soluble, bleaching chloride of peroxide of iron, which has obliged Balard to consider this bleaching chloride as a mixture of hypochlorous acid and perchloride of iron, and he thus explains why it produces hypochlorous acid when distilled. But the chloride of potassa, with excess of chlorine, submitted to distillation, also gives hypochlorous acid and a metallic chloride, which should induce us to believe the two chlorides analogous in composition. I am even inclined to think that the formation of hypochlorous acid by Balard's process with oxide of mercury, is subordinate to the production of a bleaching chloride of oxide, for by agitating peroxide of mercury suspended in water, in a bottle filled with chlorine there is formed a soluble bleaching chloride of oxide of mercury, containing all the oxide, if an excess of it is not employed in the experiment and sufficient water is present. The distillation of this chloride should necessarily produce hypochlorous acid, even without the presence of an excess of chlorine; it is therefore the most suitable of these compounds for the preparation of hypochlorous acid; for we have:



As the oxichloride of mercury is almost insoluble, it may happen that, during the preparation of the chloride of oxide of mercury by the process described above, especially if a small quantity of water be used, and there be sufficient oxide

\* Ann. de. Chim. et de Phys. vol. 57, p. 266. † Ibid, vol. 57, p. 296.

to neutralize the chlorine, the chloride may be decomposed as fast as it is produced, owing to the insolubility of the oxichloride which will be precipitated, while hypochlorous acid retaining a small quantity of oxide of mercury, or rather mixed with a little undecomposed chloride of oxide, will remain in solution. Hence it is evident that a solution of this chloride, sufficiently strong to undergo spontaneous decomposition, should furnish an acid much more concentrated than can be obtained from the chlorides of potassa and soda which are not susceptible of a similar decomposition.

The bleaching chlorides of the oxides of zinc and copper, prepared by saturating chlorine with the hydrated oxides of these metals, suspended in water, as indicated by Grouvelle, give by distillation the same products as the chloride of oxide of mercury, which renders it probable that the reaction in all these cases is the same.

Owing to the great solubility of the chlorides of the oxides of zinc and mercury, the salts of these oxides are not precipitated by the neutral chlorides of the oxides of the first section, as are the other metallic salts of the last four sections; hence an excellent way of ascertaining whether a solution of potassa or soda is saturated with chlorine, is to try if it is precipitated by a solution of corrosive sublimate.

Balard considers the bleaching and oxidizing powers possessed in common by the hypochlorites and chlorides of oxides as a strong proof of their identity. They both convert the recently precipitated sulphurets into sulphates, and may be substituted for peroxide of hydrogen in restoring the colours of paintings; but the chlorites produce the same effects, and yet they cannot be confounded with the chlorides of oxides.

The action of nitrate of silver on the chlorides of oxides, has been adduced in support of Berzelius' theory of their composition; on mixing the two solutions, chloride of silver is precipitated, and the liquid above it bleaches powerfully for a few moments; it soon, however, becomes troubled, owing to



the decomposition of the chlorite or hypochlorite, formed according to Balard, at the same time as the chloride, and from its instability unable to remain longer in solution, he considering the bleaching chloride of oxide a mixture of metallic chloride and chlorite; but it is more natural to admit that, by the action of the nitrate of silver, there is formed a bleaching chloride of oxide of silver, which, at the moment of its formation, is converted into chloride and chlorate, owing to the insolubility of the chloride, in the same way that chloride of potassa is decomposed into chloride and chlorate, owing to the insolubility of the chlorate.

Thus far, then, nothing has been adduced, to prove that the bleaching chlorides are mixtures of hypochlorites and metallic chlorides; on the contrary, facts seem to show that they are compounds of chlorine and basic oxides. Besides, nothing forbids us to admit the existence of such compounds; for it is not yet established that sulphur, the action of which on the oxides suggested to Berzelius his theory of the chlorides of oxides, cannot combine with oxides. I am induced to believe that sulphurets of oxides do exist, from the fact that precipitated hydrate of sulphur, at a temperature of from  $10^{\circ}$  to  $20^{\circ}$  Cen., dissolves in a solution of potassa or soda, which becomes coloured, and from which sulphur (not bisulphuretted hydrogen) is precipitated by hydrochloric acid, and without evolution of sulphuretted hydrogen. Hence, it is probable, that all alkaline sulphurets made in the wet, may contain sulphurets of oxides. The polysulphurets of potassium or calcium, prepared in this manner, should not be used to obtain bisulphuretted hydrogen; for the precipitate produced in them by hydrochloric acid consists of a mixture of much hydrate of sulphur, with a small quantity of bisulphuretted hydrogen—while the precipitate obtained from the polysulphuret made by dissolving sulphur in a monosulphuret of potassium, resulting from the reduction of the sulphate by charcoal, is pure bisulphuretted hydrogen, without admixture of an appreciable quantity of sulphur. This difference in the results, may partly be attributed to the presence of hyposulphites in the sulphurets,

made in the usual way; but it has never been demonstrated, that they exist there in sufficient quantity to account for the phenomena alluded to.

NOTE.—The preceding paper was concluded, when wishing to convince my class that the production of chlorate of potassa, by the usual process, is entirely the result of the decomposition of chloride of potassa, and owing to the insolubility of the chlorate, and not depending on the heat produced by the absorption of chlorine, as Morin\* conceives, I passed chlorine through a *boiling* solution of one part of potassa in four parts of water. The gas was absorbed in as great quantity as if the solution had been cold, giving a bleaching liquid of great power, and no deposit of chlorate. The saturated solution was allowed to cool; after a certain time, a large quantity of chlorate fell, and the solution lost its bleaching power to such a degree, that a slip of reddened litmus paper could be immersed in it several minutes before it lost its colour, while a similar strip was *instantly bleached* when dipped into the hot solution; a proof that the chloride of potassa existing in the boiling liquid disappeared as it cooled, producing the chlorate, which was quite as abundant as when obtained in the usual way.

This experiment furnishes a strong argument against the theory of Balard. For, as already stated, the hypochlorites are easily decomposed by slight elevations of temperature; it is therefore impossible to admit their existence in the boiling liquid obtained as above; yet it possessed all the properties of chloride of potassa, showing that the two are distinct compounds. The solutions of chloride of potassa or soda, obtained by double decomposition from chloride of lime, may be kept in ebullition a long time without losing their bleaching power, and are only decomposed when, by evaporation, they have become so concentrated as to be unable to hold the resulting chlorate in solution.

\* Ann. de Chi. et de Phys. vol. 37, p. 146.

The manufacturer of chlorate of potassa should, therefore, vary his process with the state of his solutions of chloride of potassa; if these are without excess of chlorine, as when obtained from chloride of lime, they may be evaporated at their boiling point; but if, as is usually the case, they are saturated with the gas, they should be concentrated at a temperature not exceeding 50° or 60° Cen.

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ART.—XLIX.—SEPARATION OF ARSENIC. By Mr. JAMES MARSH, of the Royal Arsenal, Woolwich.

NOTWITHSTANDING the improved methods that have of late been invented of detecting the presence of small quantities of arsenic in the food, in the contents of the stomach, and mixed with various other animal and vegetable matters, a process was still wanting for separating it expeditiously and commodiously, and presenting it in a pure unequivocal form for examination by the appropriate tests. Such a process should be capable of detecting arsenic not only in its usual state of white arsenic or arsenious acid, but likewise in that of arsenic acid and of all the compound salts formed by the union of either of these acids with alkaline substances. It ought, also, to exhibit the arsenic in its reguline or metallic state, free from the ambiguity which is sometimes caused by the use of carbonaceous reducing fluxes. It appeared to me, that these objects might be attained by presenting to the arsenic hydrogen gas in its nascent state: the first action of which would be to deoxygenate the arsenic; and the next, to combine with the arsenic, thus deoxygenated, into the well-known gas called arsenuretted hydrogen. Being thus brought to the gaseous state, the arsenic would spontaneously (so to speak) separate itself from the liquor in which it was before dissolved, and might be collected for examination by means of any common gas apparatus; thus avoiding the trouble, difficulty, and ambi-

guity of clarification and other processes whereby liquors, suspected of containing arsenic, are prepared for the exhibition of the usual tests, or of evaporation and deflagration which are sometimes had recourse to in order to separate the arsenic from the organic substances with which it may have been mixed.

I had the satisfaction of finding, on trial, that my anticipations were realized; and that I was thus able, not only to separate very minute quantities of arsenic from gruel, soup, porter, coffee, and other alimentary liquors, but that, by continuing the process a sufficient length of time, I could eliminate the whole of the arsenic in the state of arsenuretted hydrogen, either pure, or at most, only mixed with an excess of hydrogen.

If this gas be set fire to as it issues from the end of a jet of fine bore into the common air, the hydrogen, as the more combustible ingredient, will burn first, and will produce aqueous vapour, while the arsenic will be deposited either in the metallic state, or in that of arsenious acid, according as it is exposed partially or freely to the air. The former condition is brought about by holding a piece of cold window glass opposite to and in contact with the flame, when a thin metallic film will be immediately deposited on its surface; and the latter, by receiving the flame within a glass tube open at both ends, which in half a minute, will be found to be dimmed by a white pulverulent sublimate of arsenious acid. By directing the flame obliquely within side of the tube, it strikes against the glass and deposits the arsenic partly in the metallic state. In this case, if the tube, while still warm, be held to the nose, that peculiar odour, somewhat resembling garlic, which is one of the characteristic tests of arsenic, will be perceived. Arsenuretted hydrogen itself has precisely the same odour, but considerable caution should be used in smelling to it, as every cubic inch contains about a quarter of a grain of arsenic.

The requisite apparatus is as simple as possible; being a glass tube open at both ends, and about three quarters of an

inch in its internal diameter. It is bent into the form of a syphon, the shorter leg being about five inches, and the longer about eight inches in length. A stopcock ending in a jet of fine bore, passes tightly through a hole made in the axis of a soft and sound cork, which fits air-tight into the opening of the lower bend of the tube, and may be further secured if requisite, by a little common turpentine lute. To fix the apparatus, when in use, in an upright position, a hole is made in a wooden block for the reception of the lower part of a pillar, and a groove is cut in the top of the same block to receive the bend of the tube. Two elastic slips cut from the neck of a common bottle of India rubber, keep the tube firm in its place.

The matter to be submitted to examination, and supposed to contain arsenic, if not in the fluid state, such as pastry, pudding, or bread, &c., must be boiled with two or three fluid ounces of clean water, for a sufficient length of time.

The mixture so obtained must then be thrown on a filter to separate the more solid parts: thick soup, or the contents of the stomach, may be diluted with water and also filtered; but water-gruel, wine, spirits, or any kind of malt liquor and such like, or tea, coffee, cocoa, &c., can be operated on without any previous process.

When the apparatus is to be used, a bit of glass rod, about an inch long, is to be dropped into the shorter leg, and this is to be followed by a piece of clean sheet zinc, about an inch and a half long and half an inch wide, bent double, so that it will run down the tube till it is stopped by the piece of glass rod first put in. The stopcock and jet are now to be inserted, and the handle is to be turned so as to leave the cock open. The fluid to be examined, having been previously mixed with from a drachm and a half to three drachms of dilute sulphuric acid (1 acid and 7 water,) is to be poured into the long leg, till it stands in the short one about a quarter of an inch below the bottom of the cork. Bubbles of gas will soon be seen to rise from the zinc, which are pure hydrogen if no arsenic be present; but, if the liquor holds arsenic in any form in solution,

the gas will be arsenuretted hydrogen. The first portions are to be allowed to escape, in order that they may carry with them the small quantity of common air left in the apparatus; after which the cock is to be closed, and the gas will be found to accumulate in the shorter leg, driving the fluid up the longer one, till the liquor has descended in the short leg below the piece of zinc, when all further production of gas will cease. There is thus obtained a portion of gas subject to the pressure of a column of fluid, of from seven to eight inches high: when, therefore, the stopcock is opened, the gas will be propelled with some force through the jet, and, on igniting it as it issues (which must be done quickly by an assistant,) and then holding horizontally a piece of crown or window-glass over it, in such a manner as to retard slightly the combustion, the arsenic (if any be present) will be found deposited in the metallic state on the glass; the oxygen of the atmosphere being employed in oxydizing the hydrogen only during the process. If no arsenic be present, then the jet of the flame as it issues has a very different appearance; and although the glass becomes dulled in the first instance by the deposition of the newly formed water, yet such is the heat produced, that in a few seconds it becomes perfectly clear, and frequently flies to pieces.

If the object be to obtain the arsenic in the form of arsenious acid, or white arsenic, then a glass tube, from a quarter to half an inch in diameter (or according to the size of the jet of flame,) and eight or ten inches in length, is to be held vertically over the burning jet of gas, in such a manner that the gas may undergo perfect combustion, and that the arsenic combined with it may become sufficiently oxydized; the tube will thus, with proper care, become lined with arsenious acid in proportion to the quantity originally contained in the mixture.

When the glass tube is held at an angle of about forty-five degrees over the jet of flame, three very good indications of the presence of arsenic may be obtained at one operation; viz. metallic arsenic will be found deposited in the tube at the part nearest where the flame impinges,—white arsenic, or ar-

senious acid at a short distance from it,—and the garlic smell can be readily detected at either end of the tube in which the experiment has been made.

As the gas produced during the operation is consumed, the acid mixture falls into the short limb of the tube, and is thus again brought into contact with the zinc, in consequence of which a fresh supply is soon obtained. This gas, if submitted to either of the processes before described, will give fresh indications of the presence of the arsenic which the mixture may have originally contained; and it will be easily perceived that the process may be repeated as often as may be required, at the will of the operator, till no further proofs can be obtained.

When certain mixed or compound liquors are operated on in this apparatus, a great quantity of froth is thrown up into the tube, which may cause a little embarrassment by choaking the jet. I have found this effect to take place most with the contents of the stomach, with wine, porter, tea, coffee, or soup, and indeed, with all mucilaginous and albuminous mixtures. The means I adopt to prevent this effect from taking place, or, at least, for checking it in a great measure, is to grease or oil the interior of the short limb of the apparatus before introducing the substance to be examined, or to put a few drops of alcohol or sweet-oil on its surface previously to introducing the stopcock and its appendages. I have, however, found, if the tube be ever so full of froth in the first instance, that, in an hour or two, if left to itself, the bubbles burst, and the interior of the tube becomes clear without at all affecting the results.

In cases where only a small quantity of the matter to be examined, can be obtained, I have found a great convenience in using the small glass bucket. Under such circumstances, the bent glass tube may be filled up to within an inch of the short end with common water, so as to allow room for the glass bucket, which must be attached to the cork, &c. by means of a little platina wire; a bit or two of zinc is to be dropped into the bucket, with a small portion of the matter

to be examined, and three or four drops of diluted sulphuric acid (acid 2, water 14;) and the whole is then to be introduced into the mouth of the short limb of the tube. The production of gas under this arrangement is much slower, and of course, requires more time to fill the tube, than in the former case; but the mode of operating is precisely the same. Indeed, it is of great advantage, when the quantity of arsenic present is very minute, not to allow the hydrogen to be evolved too quickly, in order to give it time to take up the arsenic.

A slender glass funnel will be found of service when as much as a table spoonful, or even a tea spoonful of matter, can be obtained for examination. In this case, the tube is to be partly filled with common water, leaving a sufficient space for the substance to be examined; a piece of zinc is to be suspended from the cork by a thread or wire, so as to hang in the axis of the tube; and the fluid to be operated on, having previously been mixed with dilute sulphuric acid, is then to be poured through the funnel carefully, so as to surround the zinc, avoiding, as far as possible, to mix it with the water below, and the stopcock and its appendages are to be replaced in the mouth of the tube; the production of the gas then goes on as before stated, and the mode of manipulating with it is exactly the same as described in the foregoing part of this paper.

It will be necessary for me, in this place, to explain the methods I employ after each operation, to determine the integrity of the instrument, so as to satisfy myself that no arsenic remains adhering to the inside of the tube, or to the cork and its appendages, before I employ it for another operation.

After washing the apparatus with clean water, a piece of zinc may be dropped in, and the tube filled to within half an inch of the top of the short limb; two drachms of diluted sulphuric acid are then poured in, and the stopcock and cork secured in its place; hydrogen gas will in this case, as before, be liberated and fill the tube. If the gas as it issues from the jet be then inflamed, and a piece of window glass held over it



as before described, and any arsenic remains, it will be rendered evident by being deposited on the glass; if so, this operation must be repeated till the glass remains perfectly clean, after having been exposed to the action of the gas.

When I have had an opportunity of working with so large a quantity of mixture as from two to four pints (imperial measure), I then have employed the instrument which is, indeed, but a slight modification of one of the instantaneous light apparatuses, now so well known and used for obtaining fire by the aid of a stream of hydrogen gas thrown on spongy platinum. It will, therefore, be of importance only for me to describe the alteration which I make when I employ it for the purpose of detecting arsenic. In the first place, I must observe, that the outer vessel which I use, holds full four pints, and that the jet of the stopcock is vertical, and its orifice is twice or three times larger than in the instrument as generally made for sale, and also that there is a thread or wire attached to the cork of the stopcock for suspending a piece of zinc within the bell-glass.

With an instrument of this description, I have operated on one grain of arsenic in twenty-eight thousand grains of water (or four imperial pints), and have obtained, therefrom, upwards of one hundred distinct metallic arsenical crusts.

Similar results have been obtained with perfect success from three pints of very thick soup, the same quantity of port wine, porter, gruel, tea, coffee, &c. &c.

It must, however, be understood, that the process was allowed to proceed but slowly, and that it required several days before the mixture used ceased to give indication of the presence of arsenic, and, also, a much larger portion of zinc and sulphuric acid was employed from time to time, than when working with the small bent tube apparatus, in consequence of the large quantity of matter operated on under this arrangement.

With the small apparatus, I have obtained distinct metallic crusts, when operating on so small a quantity as one drop of

Fowler's solution of arsenic, which only contains  $\frac{1}{126}$  part of a grain.

The presence of arsenic in artificial orpiment and realgar, in Scheele's green, and in the sulphuret of antimony, may be readily shewn by this process, when not more than half a grain of any of those compounds is employed.

In conclusion, I beg to remark, that although the instruments I have now finished describing, are the form I prefer to all that I have employed, yet it must be perfectly evident to any one, that many very simple arrangements might be contrived. Indeed, I may say unequivocally, that there is no town or village in which sulphuric acid and zinc can be obtained, but every house would furnish to the ingenious experimentalist ample means for his purpose; for, a two-ounce phial, with a cork and piece of tobacco-pipe, or a bladder, with the same arrangement fixed to its mouth, might, in cases of extreme necessity, be employed with success, as I have repeatedly done for this purpose.

The only ambiguity that can possibly arise in the mode of operating above described, arises from the circumstance, that some samples of the zinc of commerce themselves contain arsenic; and such, when acted on by dilute sulphuric acid give out arsenuretted hydrogen. It is, therefore, necessary for the operator to be certain of the purity of the zinc which he employs, and this is easily done by putting a bit of it into the apparatus, with only some dilute sulphuric acid; the gas thus obtained is to be set fire to as it issues from the jet; and if no metallic film is deposited on the bit of flat glass, and no white sublimate within the open tube, the zinc may be regarded as in a fit state for use.

*Transactions of the Society of Arts.*

## ART. L.—NEW METHOD OF ADMINISTERING CUBEBS.

By M. LABELONYE, Pharmaceutist, Paris.

THE efficacy of the *Piper cubeba*, the stimulant virtue of which appears to operate specifically upon mucous membranes, and particularly that of the genito-urinary organs, is well established at the present day, in acute and chronic inflammatory affections of these parts.

This substance, nevertheless, is one of those to which pharmaceutical chemists have paid very little attention, and no one of them has made an attempt to render its administration more convenient, by improving the forms of preparation, while a large number of substances of less interest in a therapeutic point of view are capable of being exhibited under many forms, more or less agreeable.

It is usually administered in powder, and there is no physician who has not been embarrassed in his practice from the difficulty he has encountered in getting his patient to take a sufficient amount to render it efficient, in consequence of the repugnance and disgust created by it.

It has appeared to us that the subject was worthy the attention of the pharmacist, who is desirous of advancing the interests of pharmacy, and that some researches into the methods by which it could be rendered more available, would be of infinite value to the science of medicine, founded upon the power which might exist of isolating the active principles, and separating them from such as are inert, thereby saving the stomach the effort necessary to accomplish this operation.

There is another consideration, of which we have not lost sight—it is, that cubebs, like all vegetable matter, is affected by physical influences; and that it exhibits, in its chemical composition, marked differences, which render its action extremely variable. By employing, on the contrary, the active principles only, upon the amount of which depends the greater or less activity of this substance, more positive results are ob-

tained. With this design, we have undertaken to isolate these principles, and we believe that we have completely succeeded.

Our own analytical investigations, similar to those which have recently been published, have demonstrated that the *Piper cubeba* is composed of wax, green and yellow volatile oils, a balsamic resin, analogous to the balsam of copaiva, chloride of sodium, extractive matter, a peculiar substance called cubebin, having some resemblance to piperin, and obtained in the same way, and finally ligneous matter.

This ligneous matter forms about  $\frac{4}{5}$ ths of the whole substance, all the rest united form but  $\frac{1}{5}$ th. It results from these data that four fifths of the medicine used are inert, and without action upon the animal system. Although the cubebin has been many years discovered, we are not aware that the active properties of cubebs have been attributed to it alone, and we believe that they have justly been referred to the combination of the principles which have been enumerated, and particularly the volatile oils and balsamic resin, of which the action is extremely energetic.

These facts once established, it is of the highest consequence to separate all the principles from the ligneous matter, with the aid of a vehicle proper for each of them, and then to reunite them to form a uniform medicinal article, and we believe we have accomplished this by the following method :

The cubebs, reduced to a coarse powder, is placed in an apparatus for displacement and exhausted by ether, which dissolves the wax, the volatile oils and balsamic resin. The residue is submitted to the action of hydro-alcohol at 20° which dissolves the extractive principle and chloride of sodium. The alcohol and ether are separated by distillation in part, and separately. Evaporation of the hydro-alcoholic solution is then carried on in a water bath until it possesses the consistence of a soft extract, to which the ethereal product is added; the evaporation being continued for a short time volatilizes the ether completely, and a strongly aromatic extract is obtained, as consistent as honey, which it is improper to

subject any longer to the action of heat, in consequence of the contained volatile oils, and which in all cases interfere with complete desiccation.

A kilogramme of the cubebs yielded six ounces four drachms, one part of the extract then is equivalent to five of the cubebs.

This hydro-alcoholic ethereal extract can be administered in all medicinal forms. It can be readily mixed in water by means of mucilage, it can be taken in potions, by injections, &c. &c.

Some trials which should be repeated, demonstrated greater activity of this article, than of the quantity of cubebs represented by it. We shall leave the cause of this, when the fact has been well established, in the hands of clinical observers.

The best form of exhibition is in troches or pastils of an ovoid form, because this mode is most agreeable and convenient to patients, or that of an emulsive syrup may be used.

The following are the most eligible formulæ:

*Pastils, or troches of cubebin, or hydro-alcoholic ethereal extract of cubebs.*

℞. Hydro-alcoholic ethereal ext. of cubebs,	ʒviij.
Alcohol,	lbij.

Dissolve and add—

White sugar in fine powder,	lbj.
Oil of peppermint,	gtt. xvijj.

Pour the mixture into flat vessels upon a stove, and allow the alcohol to evaporate at a moderate heat. When the mass is completely desiccated, reduce it to fine powder, and add a sufficient quantity of the mucilage of gum tragacanth to form troches—18, 12, 9 or 6 grains each. Most persons can swallow with facility those weighing 18 grains, and containing 6 grains of the extract; 10 of these are equivalent to half an ounce of the powder. If those weighing 12, 9 or 6 grains are taken, they can be oftener repeated.

*Syrup of the hydro-alcoholic ethereal extract of Cubebs.*

**R.** Hyd. alcohol. eth. ext. of cubebs, ℥iij.

Suspend by means of mucilage, in

Peppermint water, lb. i.

Add—

White sugar lb. ij.

Four ounces of this syrup contain two drachms of extract, equivalent to ten of the powdered cubebs. A tea spoonful may be taken as a dose in water.

M. Labelonye has devised a method of administering the cubebin in the form of sugar-plumbs of an ovoid form, which enclose the substance and prevent its contact with the mouth and throat. These plumbs, when moistened, are easily swallowed; their solution in the stomach is facilitated by the action of the muriatic acid therein contained, and their action upon the organs is rendered more immediate. Each contains six grains of cubebin.

The following is the formula:

**R.** Hyd. alc. ether. ext. of cubebs, ℥viiij.

Mucil. of tragacanth, ℥i.

Mix intimately and add a sufficient quantity of refined liquorice.

Form the above into a mass, and divide into pills, so that each shall contain six grains of the cubebin. Dry them with moderate heat, and envelope them with sugar, as in the ordinary sugar-plumb.

*Bull. gen. de Therap.*

## ART. LI.—HYDROSULPHURIC AND HYDROSELENIC ETHERS. By C. Lowig.

OXALIC ether renders essential service in the preparation of several ethers of the hydracids, which have not hitherto been known, as for instance the hydrosulphuric and hydroselenic, by bringing it in contact with the sulphuret and seleniuret of potassium. Hydrocyanic and hydrosulfocyanic ethers are prepared in the same manner. Mutual decomposition at the same time takes place with difficulty, and even with a large excess of the compound of potassium, a very considerable quantity of undecomposed oxalic ether passes over by distillation. Hydrosulphuric ether is obtained in the following manner; simple sulphuret of potassium, prepared by decomposing the sulphate of potassa with charcoal, &c. reduced in a heated capsule to a fine powder, is introduced while warm into a retort, and then mixed with a sufficient quantity of oxalic ether, to form a thick pap. After the mixture has been allowed to remain during several hours exposed to a moderate heat, and great care has been taken to exclude the introduction of moisture, so that no sulphuretted hydrogen, or alcohol may form, the process of distillation is commenced and continued with increase of heat until the oxalate of potassa which has been formed commences to be decomposed. The product of the distillation, composed of hydrosulphuric and oxalic ethers, is agitated during the requisite length of time with the concentrated solution of pure potassa, or sulphuret of barium, which decomposes the oxalic ether. The hydrosulphuric ether thus purified, is decanted and rectified with the chloride of calcium. Its purity is tested by the circumstance, that agitated with the solution of sulphuret of barium it no longer affords a precipitate.

Hydrosulphuric ether is lighter than water and possesses an extremely disagreeable odour, of ether and assafoetida, which is very diffusible. It has a sweet persistent taste, and has no

effect upon test paper. It is little soluble in water but communicates in a high degree to this menstruum its taste and smell. It mixes in all proportions with alcohol and the ethers. It burns with a blue flame, disengaging sulphurous acid. On exposure to the air no alteration takes place. If mixed with an aqueous solution of potassa and heated to ebullition, it is not decomposed, while if distilled with the hydrate of potassa in powder, the sulphuret of potassium and alcohol are obtained, but decomposition in this way does not take place readily, and a large quantity of undecomposed ether is disengaged. Potassium decomposes it at a moderate heat, but soon ceases to act, in consequence of the metal becoming encrusted with the sulphuret of potassium and preventing any further action; there is no evolution of hydrogen during this decomposition.

Hydrosulphuric ether exhibits no action upon the deutoxide of mercury, and in this is very distinct from mercaptan, as would be predicted. It, however, precipitates several heavy metallic salts, especially an alcoholic solution of acetate of lead, which is thrown down of a yellow colour. Mixed with a concentrated alcoholic solution of sulphuret of potassium, a white substance is precipitated resembling the mercapturet of potassium of Zeise.

This ether, very probably, can also be prepared by submitting to distillation a well mixed combination of sulphuret of potassium and dry sulphovinate of baryta; the distilled liquid obtained in this way, at least presents all the properties of the ether described. The contact of water in this preparation must be equally avoided. M. Lowig promises to publish hereafter the analysis of hydrosulphuric ether, as well as its specific weight, point of ebullition, and many other of its properties.

The author has obtained the hydroselenic ether in very small quantity, and consequently has little to say of its properties. Its smell is as disagreeable as that of hydrosulphuric ether, it burns with the deposition of selenium and diffuses the smell of horse-radish; in other respects it resembles hydrosulphuric ether.



M. Lowig has found, in *hydrocyanic ether* prepared with oxalic ether, properties analogous to those of the hydrocyanic ether of M. Pelouze.

*Journ. de Pharm. and Annal. der Physik und Chemie.*

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#### ART. LII.—ON THE USE OF LEAD IN EUDIOMETRY.

By M. THEODORE DE SAUSSURE.

It is known that leaden shot, moistened with water, and agitated with common air, absorbs oxygen from the latter, at ordinary atmospheric temperatures. This property, which has not hitherto been applied to any useful purpose, affords a method by which the proportion of oxygen in the air may be determined within the one-thousandth part, and which in several respects, may be found preferable to the eudiometers in common use. The process requires about three hours agitation for its completion. The vessel in which the operation is performed is a matras, or cucurbit, to the neck of which is cemented a metallic ring, with slopes fitted to receive a key. This ring contains a screw which extends rather less than two-tenths of an inch within the ring, and is adapted to a metallic plug with a square head, also fitted to receive a key. There is a flanch about one-fourth of an inch wide, provided with a collar of leather, which is made to press the outer edge of the ring of the matras. The keys are designed to screw down firmly the plug, and to prevent the necessity of touching the matras during the operation. The matrasses employed in my experiments on common air, have had a capacity of from nine to twelve cubic inches. The neck was generally about six inches long, and its capacity from one-third to one-fourth that of the body or bulb of the instrument, in order to measure the absorption of atmospheric oxygen in this part of the matras. The glass ought not to be less than  $\frac{1}{23}$  of an inch in thickness, owing to the danger of breaking by the agitation of the shot. The grains of shot should be the

smallest found in commerce, of which about six will weigh one grain.

A quantity carefully determined by previous weighing, is to be used in each experiment, and is to be very nearly equal to one-fifth the weight of water which the matras will contain. The weight of water for moistening the shot should be one-seventeenth part of that of the metal when dry; a quantity either greater or less than this retards the operation. An excess of water has the additional inconvenience of forming a scum, which interferes with the accurate determination of the volume of gas, left after absorption. Hence the water which moistens the shot is less than  $1\frac{1}{2}$  per cent. of the volume of air under examination. The matras charged with moistened shot, and with the mouth open, is exposed for two or three hours in the open air, or the air is renewed with a bellows with a recurved nozzle. Having observed the temperature and pressure of the air, the matras is closed by means of the keys already mentioned. In the analysis of other gases than atmospheric air, a retort, closed by a stopcock, is substituted for the matras already described, and the shot is kept in the body of the instrument. Having exhausted this instrument, the gas to be tried is admitted. In some cases, the air-pump may be dispensed with by filling up the vessel with water after having put in the shot. The water is then displaced by admitting the mixed gases from the pneumatic cistern. The shot is drained by inclining the retort, still held over the cistern. The retort is now plugged with a metallic screw to bring the shot in contact with the mixed gases, and the remaining gas is transferred to a graduated tube in order to be measured. Before transferring, however, the retort neck is plunged under water, of a lower temperature than that at which it was filled. A momentary condensation ensues, intended to prevent the possibility of any escaping in case no absorption had taken place.

In experimenting on atmospheric air, the analysis of which admits of greater exactness than that of other gases, the grains of moistened lead which have hitherto remained unaffected

by the air from being carefully preserved from agitation, are now to be violently shaken entirely in the bulb of the matras, so as to avoid tarnishing the neck. The bulb becomes coated with a yellow pigment, which by three hours of agitation changes to a brownish gray tint, due to a mixture of yellow oxide, with very fine particles of lead, indicating clearly that all the oxygen gas has disappeared. This process affords very pure nitrogen gas. Nitrous gas produces not the slightest diminution of its volume. The method of closing the matras with a screwed stopper is so effectual that it may be left, and the agitation of the shot suspended for an indefinite period.

Having weighed the matras by means of a balance sensible to one or two-tenths of a grain, it is opened while inverted under water, the stopper is replaced by an open stopcock, and while inverted, it is fixed in a ring which by sliding up and down may allow of adjusting the height so as to bring the water to the same level within and without the neck. The temperature and pressure of the air are again observed, and the stopcock is then closed, which should be so easily turned as not to require placing the hands on the matras. The difference in weight of the vessel when partly filled with water, after the absorption, and of the same when entirely filled with water, shows how much gas remains after the absorption is complete. By a similar process, the volume of air before absorption is measured, making due allowance in both cases for the approximate weight of air or gas displaced by the water.

If the neck of the matras were correctly graduated, we might determine by inspection the amount of absorption; but this mode of estimating quantities is too uncertain, and the graduation on a large irregular tube, generally too imperfect to give even a tolerable approximation to the degree of exactness obtained by weighing.

Though it is not proposed to substitute this process by the oxidation of lead, in ordinary analysis, for that of Volta—so prompt and convenient in execution, and so indispensable in various investigations—yet it will be found that the oxi-

dation of lead possesses the following advantages: In the determination of the oxygen by the combustion of hydrogen, uncertainties arise, both from the impurities of the latter gas, and from the destruction of some of the nitrogen.

Chemists are not agreed as to the proportion of oxygen gas in common air, as indicated by the eudiometer of Volta. Humboldt and Gay Lussac made it 21 per cent.; Dalton 20.7 or 20.8; Henry is doubtful whether it be 20 or 21; while Thompson makes it 20. Allowing for the accidental errors inevitable in the use of Volta's apparatus, the chief difference between the results above cited, appears to depend on the different doses of hydrogen, which had been mixed with the atmospheric air for detonation. Humboldt and Gay Lussac made use of *equal volumes* of air and of hydrogen, obtaining thereby, as above stated, 21 per cent. of oxygen. Other authors use a half volume of hydrogen, but my own experiments with this proportion have furnished a result indicating but 20.6 per cent. of oxygen, under the same circumstances in which the other operation gave 21 per cent. It may be proper to remark, that the mixture of two parts of common air with one of hydrogen, has the advantage of extending very much the use of Volta's eudiometer, for the analysis of impure airs in experiments on respiration and fermentation; for 100 parts of corrupted air, which contain 88 of azote and 12 of oxygen, may be analyzed by a single detonation, if we use 50 parts of hydrogen; whereas, 100 of air, which contain 84 of azote and 16 oxygen, cannot be inflamed by the electric spark, if we add so much as 100 parts of hydrogen. It may be also remarked, that the adding of oxygen to the air, previous to the analysis, only complicates the operation, requires a separate previous analysis of the latter to ascertain its purity, and consequently lacks precision in the result.

The method by oxidating lead introduces no new gaseous ingredient into the air under trial; whereas the residue of a detonation with hydrogen is vitiated by the latter, even after the total combustion of the oxygen.

The *phosphorus eudiometer* has the disadvantage of leav-

ing a residuum, rendered impure by the vapour of phosphorus, by phosphuretted hydrogen, and pure hydrogen, which accompanies the latter. These gases are produced, not by the phosphorus, but by the continued contact of water with oxide of phosphorus. Though these inconveniences may, in a great measure, be remedied by washing the residuary gas with a solution of potash, still they do not allow of obtaining any greater degree of certainty, than to fix the proportion of oxygen in common air between 20 and 21 per cent. Whenever hydrogen exists in air as an impurity, the method of analyzing by phosphorus, even at low temperatures, cannot be adopted.

The lead process is more correct than that in which hydrosulphurets are employed, in proportion as the quantity of water required in the latter case, is so much greater. When not already saturated with nitrogen, this liquid will absorb some of that gas from the residue of the analysis; and if fully saturated, it is liable to part with some, and thus increase the quantity remaining after the operation. It is also superior to the same process, when applied to determine the quantity of oxygen in mixture with carburetted hydrogen; for the latter is absorbed in certain proportions by the hydrosulphuretted liquid, according to its temperature and the degree of its concentration. The eudiometric indications of lead will possess a greater degree of exactness, when, instead of measuring the absorption of oxygen by its volume, it shall be determined by the weight which the metal gains by oxidation. It will only be necessary to dry in vacuo, and in the same vessel in which the oxidation was produced, the residuum—the composition of which is not yet accurately determined.

Lead in contact with air and water, absorbs carbonic acid. The open air contains too small a proportion of this acid to give an indication which, at a single trial, could be distinguished from the errors of observation. The mean of several trials may, however, give a more precise result. From several experiments, made in the day time, I have found as a mean, in 100 parts of air, 21.05 per cent. of oxygen and carbonic acid.

Now, as the mean quantity of the latter gas is known to be  $\frac{4}{10000}$  of the whole, we have, by deducting this, 21.01 for the proportion of oxygen.

100 parts of air, taken from an elevation of 10,000 feet above the ocean, contained, after having been deprived of their carbonic acid by pure potash, 20.903 parts of oxygen. Air collected in a crowded ball room at the theatre in Geneva, was found to contain 20.81 per cent. of oxygen, and  $\frac{2.4}{100}$  of one per cent. of carbonic acid.

*Jour. de Phar. and Bib. Univ. of Geneva.*

#### ART. LIII.—ON THE PREPARATION OF PROTOIODIDE OF MERCURY. By P. H. BOUTIGNY.

IODINE and its combinations have furnished medicine with several energetic preparations. Most of these combinations have been studied by chemists and are well known and defined; I wish, however, to say a few words on the protoiodide of mercury.

This is one of the surest remedies in the treatment of syphilitic affections, few of which resist its influence, though it has failed in some instances owing in my opinion to errors in its preparation.

The principal modes which are employed in making it are: 1st, mixing together one atom of protochloride of mercury, and one atom of hydriodate of potassa; this mixture is placed in a porcelain capsule and boiling water added; on cooling, the precipitate is collected on a filter, washed and dried. 2d, precipitating the protonitrate of mercury by means of hydriodate of potassa. 3d, using the protoacetate instead of the protonitrate of mercury. Finally, the fourth plan, which is the most simple and direct, but also the most liable to error, is by triturating together two atoms of mercury and one atom of iodine with a little alcohol, till the mercury disappears. The protoiodide prepared in this way always contains metal-

lic mercury, and is always less active than when made by the first process, and moreover it is impossible to procure a pure protoiodide by this method as this salt is composed of one atom of each of the constituents.

As to the second and third processes, any advantages they may offer are balanced by a serious drawback—the difficulty of obtaining the mercurial salts at a minimum of oxidation. It must be evident that this is an indispensable requisite, as otherwise, the protoiodide would be mixed with variable quantities of the deutoiodide, rendering the remedy far more powerful and perhaps fatally so.

The following I believe to be the best:

℞. Pure Calomel,                    ℥ij ℥v.  
Dry Hydriodate of Potassa, ℥ij ℥iv.

Pulverize the hydriodate in a glass mortar and add the Calomel, place the mixture in a porcelain capsule and pour over it ten or twelve ounces of boiling distilled water. After cooling, decant the fluid, collect the precipitate on a filter and wash with distilled water. Dry in the shade and keep in a glass stoppered bottle.

The protoiodide thus prepared may sometimes contain a minute portion of mercury or of its proto-chloride, arising from the hygrometic state of the calomel and hydriodate at the time of weighing them, but the quantity of either is so small as to be of no moment.

*Bull. gen. de Therap.*

ART. LIV.—ON THE COMBINATIONS OF TARTARIC AND PARATARTARIC ACIDS WITH ETHER AND HYDRATE OF MYTELENE. By M. GUERIN VARRY.

M. GUERIN VARRY has discovered that in the reaction between anhydrous alcohol and tartaric acid, either with or without heat, a new acid is produced which he calls *Tartrovinic*. It is obtained in the following manner: boil the alcohol and tartaric acid for some time, and to the liquid add carbonate of baryta until it is entirely neutralized; then decompose the new salt of baryta thus formed by sulphuric acid; separate the sulphate of baryta, and evaporate under the receiver of an air-pump the liquid which remains.

Tartrovinic acid is white, with a saccharine and acid taste, it crystallizes in prisms with oblique bases, burns with a bluish flame resembling that of alcohol, and in burning emits the same odour as tartaric acid.

If kept in a state of ebullition with forty times its weight of water during ten hours, it becomes entirely transformed into alcohol and tartaric acid. Decomposed by heat, it yields alcohol, water, acetic ether, acetic acid, carbonic acid, carburated hydrogen, a volatile oil, and a substance resembling pyroacetic spirit. The residue consists of pyrotartaric acid and an oleaginous substance.

The tartrovinic acid acts upon iron and zinc, with the evolution of hydrogen.

It precipitates baryta from water; the precipitate is insoluble in an excess of acid. It has not the same effect upon strontia, potassa, or soda; it forms a precipitate with lime water, which becomes redissolved by an excess of acid. Its composition is—2 atoms of tartaric acid, 1 atom of ether, and 1 atom of water.

This formula represents it:  $C^8H^8O^{10} + C^4H^{10} + H^2O$ .

*Tartrovinates*.—These are unctuous to the touch, crystallize in handsome forms, burn with flame, fuse between  $175^\circ$  and  $215^\circ$ , are decomposed above this temperature, are soluble



in water and diluted alcohol, and are changed by ebullition in water, into alcohol and tartaric acid.

Treated with an alkali between  $160^{\circ}$  and  $170^{\circ}$ , they disengage alcohol, acetic ether, and an excessively bitter oily substance.

The tartrovinate of silver is anhydrous; all the others studied by the writer, contain water of crystallization, which can be removed by evaporation.

The dry tartrovinates can be regarded as formed of 2 atoms of tartrovinic acid, 1 atom of ether, and 1 atom of the base.

*Paratartrovinic Acid.*—This is obtained in the same way as the tartrovinic acid, from which it only differs in composition by an extra atom of water. Its chemical properties are very different from those of tartrovinic acid. The same is the case with the corresponding salts which are formed by the acids, although the paratartrovinates have, when dry, the same composition as the tartrovinates. The spirit of wood, (bihydrate of methylene,) submitted to a similar action of tartaric and paratartaric acids, produces tartromethylic and paratartromethylic acids, which in composition and the salts which they form, perfectly correspond to the tartrovinic and paratartrovinic acids and their salts.

*Journal de Pharmacie.*

## ART. LV.—NOTICE OF A NEW SALT OF COPPER.

By F. WOHLER.

I HAVE found that the neutral acetate of copper can combine with a larger proportion of water, than that contained in the ordinary crystallized verdigris. The new salt is interesting in many points of view; it forms large, very beautiful transparent crystals, of the same blue colour as the sulphate of copper, which establishes at once a well marked difference between it and the common neutral acetate. If a crystal is heated to  $30^{\circ}$  or  $35^{\circ}$  C., it becomes immediately opaque and green, like verdigris, without change of form, and can then be crumbled, by gentle pressure, into a mass composed of the minute crystals of verdigris. This transformation is more apparent, when the salt is thrown into warm water; moreover, the slower a crystal is heated, the larger and more distinct are the crystals into which it is subdivided. This phenomenon has a perfect analogy with such known modifications of form, as take place without a change of composition, and which have been noticed in sulphate of zinc, sulphate of magnesia, &c.; and it is for this reason especially, that this salt of copper appears to me worthy of some attention, for it shows that in phenomena of this kind, care should be taken to observe and distinguish between the cases where a change of form occurs without change of composition, and those in which one is the cause of the other. The phenomenon we have presented, belongs to the last mentioned; as, to the alteration of colour and form is added, the separation of  $\frac{4}{5}$  of the water of crystallization of the salt, which last is not perceived while the crystal yet remains entire, although rendered pseudomorphous, because the separated water remains enclosed between the minute crystals of the new formation; and, for the same reason, immediate analysis shows that in it there is the same proportion of water as in the modified crystal. This circumstance might easily escape detection; for a similar crystal, upon becoming green, may allow of the gradual evaporation of this

water, even small as it is, by contact with the atmosphere. But it is only sufficient to submit it to compression, to find that the aggregate of minute crystals are impregnated with water; and if this be done between sheets of blotting paper, they will be thoroughly moistened.

The quantity of water which abandons the blue salt in its transformation to the green one, is from 26 to 48 per cent.; it is four times as much as what still remains in the latter, that is to say, in the ordinary crystallized verdigris. The blue salt then contains 33.11 per cent., or 5 atoms of water; it is obtained in a very simple manner by dissolving verdigris in water acidulated by acetic acid, at a temperature below the point of ebullition and then allowing it to crystallize.

*Jour. de Phar. from the Ann. de Physik und Chemie.*

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#### ART. LVI.—ON THE PRESENCE OF ARSENIC IN PHOSPHORUS.

Mr. HERTZ an apothecary having observed that phosphoric acid prepared according to the Prussian pharmacopœia, by treating phosphorus with nitric acid, becomes of a yellow colour on the addition of a solution of sulphuretted hydrogen, Mr. Barwald made some experiments on the subject; he passed a current of sulphuretted hydrogen through phosphoric acid prepared in the same way, and obtained from a pound of the acid, eight grains of a yellow precipitate, which when mixed with carbonate of soda, was decomposed in a glass tube, by means of dry hydrogen.

A metallic ring was formed at the upper part of the tube; which, from its appearance and its odour when placed on live coals, was ascertained to be metallic arsenic. Phosphoric acid from other shops in Berlin, afforded the same results. Mr. Barwald satisfied himself by careful experiments that neither the vessels employed, the nitric acid used in preparing the

phosphoric acid, nor the sulphuretted hydrogen, contained arsenic, and that the arsenic was combined with the phosphorus itself. He also learned from another druggist, that water in which phosphorus had been long kept, was also found to contain arsenic; this fact was also confirmed by Wittstock. Nevertheless, phosphorus which he himself prepared was exempt from this admixture.

From other experiments he ascertained that a considerable proportion of arsenic might be mixed with phosphorus, without changing the external appearance of the latter, except that it became of a deeper colour especially at the surface. If the quantity was very great, the mixture was of a steel gray colour, but was soft and ductile like wax.

Mr. Barwald attributed the presence of this metal in the phosphorus to the sulphuric acid employed to extract the phosphoric acid; and describes in what way a pure phosphoric acid may be obtained from phosphorus containing arsenic; for this purpose he advises, that the phosphorus be treated with thirteen times its weight of hot nitric acid of a specific gravity of 1,200, in large glass vessels having a narrow opening, till the phosphorus is all dissolved. When the solution is evaporated to one half, a violent reaction takes place accompanied with a disengagement of red fumes. Mr. Wittstock explains this, by admitting that the diluted nitric acid, at first only changes the phosphorus to the state of phosphorous acid, and that it only becomes phosphoric acid when the menstruum has become sufficiently concentrated; at this stage the phosphoric acid is formed at the expense of the nitric acid that remains. This latter must be added as long as red fumes are disengaged. The evaporation is to be pursued in a platina or porcelain vessel as long as nitric acid is given off, which takes place when the temperature has been raised to about 400° F. The phosphoric acid is then to be purified by means of sulphuretted hydrogen. To get rid of any excess of this latter, Mr. Wittstock uses vegetable charcoal, heated to redness and then treated with nitric acid and well dried.

M. Liebig, in repeating the experiments of MM. Barwald and Wittstock, ascertained that phosphorus purchased at Francfort also contained a considerable quantity of arsenic. He also verified the assertion of these chemists, that in the oxygenation of phosphorus, by diluted nitric acid, there was principally a formation of phosphorous acid; and also that when this acid solution is evaporated, to get rid of the nitric acid, at a certain degree of concentration, there is a formation of phosphuretted hydrogen, which reduces all the arsenic or arsenious acid present; hence there is a deposition of a heavy black powder; this is metallic arsenic. This able chemist, therefore, proposes, in the purification of phosphoric acid, to use phosphorous acid instead of sulphuretted hydrogen, as the latter sometimes requires several days before it completely fulfils the intention. His plan is as follows: two parts of phosphorus are to be oxygenized by diluted nitric acid, the solution evaporated to drive off the nitric acid, until the arsenic is deposited. At the same time, one part of phosphorus in cylinders contained in glass tubes, is to be placed in a funnel, in a cellar, and the phosphatic acid (a mixture of phosphorous and phosphoric acids,) thus obtained, is to be used to purify the phosphoric acid; for this purpose the latter is to be diluted with a little water, filtered, the phosphatic acid added, and the whole evaporated; if any arsenic is deposited, the process is to be repeated.

*Journ. de Pharm.*

ART. LVII.—UPON A REDDISH BLUE COLOURING MATTER, WHICH FORMS FROM THE DECOMPOSITION OF OSCILLARIAS. By Prof. NEES D'ESENBECK, of Bonne.

M. BLUFF, of Aix la Chapelle, having sent a quantity of *Confervæ*, procured from the warm springs of that place, to M. Nees d'Esenbeck, at his request; a glass vessel containing them, and filled with mineral water, was received by him on the 15th of December, 1834. They were not, however, in the state requisite for studying their characters, and the vessel remained in a room well lighted, but not exposed to the sun, in which the temperature varied from 8° to 10° R. On the 8th of January, the water which covered the green, slimy deposit, exhibited a singular and beautiful play of colours. It was blood-red when viewed from above, and a beautiful sky-blue when held against the light. Upon opening the vessel, an insupportable marshy exhalation, combined with sulphuretted hydrogen, issued from it. The fluid was separated by the filter and distilled water poured upon the deposit; this, at the end of twenty-four hours, assumed the same deep hue. This operation was repeated during eight days, and always at the end of twenty-four hours a beautiful coloured liquid was obtained; so that the small quantity of half putrid oscillarias afforded a rich source of colouring matter. The smell of sulphuretted hydrogen disappeared after the second maceration, and the strong marshy odour alone remained. The *confervæ* were slowly reduced to a slimy deposition. The following experiments were then made on the filtered water, possessing this beautiful colour:

In a glass tube, exposed to the rays of the sun, the colour remained until the end of three weeks, but this colour was equally long a time in disappearing in a glass excluded from the light: during the evaporation of the liquid, an intolerable stench was generated, and the residue of a violet colour, when washed with alcohol, continued to emit the strong odour of animal excrement. This residuum was almost insoluble in

water, but produced a blue solution by the addition of muriatic acid.

To experiment with reagents—the liquid of the last macerations was chosen, which from all appearances no longer contained a portion of the mineral water. The changes produced by these reagents were observed at the termination of eighteen hours.

With alcohol a reddish purple flocculose precipitate was formed.

Tincture of galls produced a deep blue precipitate, the supernatant liquid was yellow and clear.

Nitrate of silver occasioned a dirty brown precipitate; and complete decolouration.

Acetate of lead afforded an abundant white precipitation, and sulphate of copper a feeble sky blue precipitate.

Alum and carbonate of potassa formed a copious white precipitate with a violet tint.

With the protonitrate of mercury a very beautiful violet precipitate was thrown down, and complete decolouration with corrosive sublimate; the precipitate was copious, flocculent and of a beautiful deep blue. Muriatic acid heightened the colour, sulphuric acid yielded a precipitate slightly violet, and lime water one of a white colour and flocculose.

It may be inferred with much apparent truth, from the chemical properties which have been described, that the cause of the colour is attributable to a substance closely allied to albumen. The manner in which it is affected constitutes a marked distinction between it and the known blue vegetable colouring matters; thus it is in a manner the opposite of Heliotrope in its properties. It is equally dissimilar to the blue colouring matter of flowers, in the effects which acids produce upon it; its want of durability distinguishes it from indigo. This colour on the contrary resembles the blue colour which MM. Caventou and Bonastre obtained from the white of eggs treated with muriatic acid: but in the liquid in question, no muriatic acid was present, and these authors do not mention that this colour appeared sometimes red and at others blue.

In the last peculiarity this substance resembles the opaline matter, which, however, is in every respect chemically different from it. M. Nees d'Esenbeck proposes for it the name *saprocyanine*, or rather as the colour appears blue and red, that of *saprochrome*.

As it is to be presumed that the source of the colour exists in the confervæ which belong to the genus *oscillaria*, the following comparative experiments were made:

A liquid containing vegetable albumen and prepared with the juice of the potato, was placed in the same circumstances, but without obtaining the result expected. With the *zygnema quininum*, the *sphærococcus crispus* and the *pamella cruenta* of Agardh, the same thing occurred. The addition of muriatic acid did not produce a blue colour.

The recent *nostoc communis* exhibited at the end of twelve days a red tint, without this alga being altered, but the colour did not continue long. The dried *nostoc* produced no colour at all.

The experiments with the *oscillaria nigra* (Agardh,) were more successful. This *oscillaria* submitted to experiment on the 28th of January, exhibited in four weeks upon the surface of the deposit a beautiful shade of colour between violet and red, which upon agitation was communicated to the water. The liquor at that time exhaled a strong marshy odour, without the cadaverous character belonging to the phenomenon produced by the *oscillaria* from Aix la Chapelle.

The *cercaria viridis* M. which in the summer of 1835 had collected in considerable quantity in a reservoir of the botanic garden, so that the entire surface was covered with a thick grass green layer of dead animalcules, did not produce the colour in question.

It cannot be any longer doubted that the very remarkable genus *oscillaria* more particularly, and the *nostoc communis*, both equally abounding in azote, were the causes of the phenomena we have described; and that azote which distinguishes these genera from the various other common confervæ must



play an important part in the production of this colouring matter. But it is proved at the same time by the experiment upon the *cercaria* which has been mentioned above, that matter purely animal, evincing, as in this case by the green colour, a still greater resemblance to those algæ which are most consistent, is not fitted for the production of this colouring material.

Several other specimens of *confervæ* obtained from Aix la Chapelle, in a perfect state of preservation, were recognised as belonging to *oscillaria vivida* (Agardh,) a species closely allied to *O. limosa*. But certainly the warm springs of Aix la Chapelle must contain numerous other species of the same genus.

The subject which has just been considered, important as it is, connected with the astonishing group of *oscillarias*, which seem to be the link between vegetable and animal life, can, moreover, assist in the explanation of the phenomenon termed blood-like water, bloody rain; and upon which, a most meritorious naturalist, Professor Ehrenberg, has lately presented so complete a memoir. In it we are informed of all the infusoriæ variously coloured red, and of the minute plants of the families fungi and algæ, which have been considered the cause of blood-like water.

The observation of M. Nees d'Esenbeck, is distinguished by the difference of colour, according to the direction of the light, and by the cause of its production, the decomposition of the algæ. To the same cause must be attributed the blood-like water of Lake Lubotin, examined by Klaproth; at least, the description of this water, and its chemical properties, exactly resemble those of the water experimented on by M. Nees d'Esenbeck, and the *myriophyllum spicatum*, which is presumed to be the cause of this phenomenon, can have but little part in its production.

Another similar investigation is that of Vauquelin, upon a substance derived from the spring of Vichy. The liquid, of which this chemist speaks, does not differ from the reddened

water of M. Nees d'Esenbeck, and the solid portion appears to be the oscillaria undergoing decomposition, and which can never be deprived of its earthy particles.

*Journ. de Pharm. and Annalen de Pharmacie.*

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ART. LVIII.—REDUCTION OF THE DEUTOXIDE OF MERCURY IN OINTMENTS.

M. REFUEVILLE, Jr. in a letter to the Editors of the *Journal de Pharmacie*, states that in the preparation of the ointment of the deutoxide of mercury with a certain amount of the oxide to the ounce of lard perfumed with orris root and lavender, he has remarked that this mixture at the end of several months assumes a metallic aspect, deep in proportion to the amount of the oxide employed.

M. Planche had made some investigations into this subject, and had observed that in the red precipitate ointment made with lard, the reduction took place in four months, while with the basilicon ointment it did not undergo this change until the end of six. M. Refueville directs attention to the fact that all the ointments thus altered in colour are rancid, and suggests the probability that the matters added to the oily substance in the basilicon ointment preserve it from rancidity; upon which supposition the longer time occupied in working the change of deoxygenation in this unguent is explained. The basilicon of the French Codex contains wax, rosin, black pitch and oil.

## ART. LIX.—TROCHES OF IPECACUANHA.

It appears, that by following the directions given in the formula of the *Codex Medicamentarius* for making this preparation, the saccharine paste is extremely apt to be of a more or less deeply marked gray colour, in consequence of the affinity between the extractive principle of the Ipecacuanha and the water of the mucilage. The endeavour to improve the appearance of the medicine, made by various French pharmacutists, who directed their attention to the subject, appeared to be unsuccessful, until a method was recently proposed by M. Vaudamme, of Hanzebrouck, by which, from his statement, the desirable degree of whiteness is secured; this method, followed by the adequate extent of desiccation by a stove, produced a handsome article perfectly white. It is as follows:

Take of Pulverized Ipecacuanha,	12 grammes.
Very white sugar,	365 “
Gum arabic,	20 “
Pure starch,	96 “
Orange flower water,	40 “

A mucilage is first made with the starch and orange flower water; the ipecacuanha is intimately mixed with a part of the sugar, the gum arabic and the remainder of the sugar are incorporated into the mucilage, and finally the process is concluded by the addition of the Ipecacuanha and sugar united, the whole forming a homogeneous paste, to be divided into cakes of two grains each.

ART. LX.—NOTE UPON THE DISTILLED OIL OF  
CAOUTCHOUC. By W. GREGORY.

THIS oil discovered by Mr. Enderby of London, possesses very remarkable properties. It is volatile, extremely fluid, and has an exceedingly low specific gravity. Of this oil I procured a certain quantity from Mr. Enderby, who stated that he had simply purified it by rectification. After having rectified it twice, without ebullition and so gradually as to pass over but two drops per minute, which was accomplished at a temperature between 25 and 30°, I ultimately obtained a liquid weighing 0.666 at 15°. Up to the present time, but one liquid having less specific gravity is known; this is the *eupione* of M. Reichenbach, the density of which is 0.655. But the oil of caoutchouc is not eupione, for it is acted upon and decomposed by sulphuric acid, while eupione when purified by means of this acid is perfectly capable of resisting it.

The odour of the oil of caoutchouc is peculiar and in a slight degree resembles that of eupione, it is however less agreeable and more ethereal. It has no fixed point of ebullition. That of 0.670 begins to boil at 35°, but the temperature soon becomes higher, and at the termination of the distillation it has risen to 65°. This substance therefore cannot be regarded as pure and uncombined.

I have however analyzed it, and the results of the analysis closely correspond to the formula  $\text{CH}_2$ , that of olefiant gas.

When sulphuric acid is added by little and little to the oil at the bottom of a long tube, taking care to close and refrigerate the tube after each addition, a liquid is obtained which is supernatant upon a brown mass and equal in quantity to half the oil employed. This liquid, after being washed with water and potassa, was distilled, and furnished an oil having an aromatic terebinthinate odour and boiling at 225°, or perhaps a little higher, a circumstance somewhat remarkable. The analysis of this new liquid still gave the formula  $\text{CH}_2$ .

These analyses have been made by M. Liebig, who direct-

ed the attention of chemists to the alteration which oil of caoutchouc underwent by the contact with sulphuric acid. M. Liebig, (*Annalen der Pharm.* Oct. 1835,) has thrown out the idea that this oil may be changed into eupione by the acid; and if this is so, it is probable that the eupione is produced by the reaction of the acid employed to extract it, according to the method of M. Reichenbach. It does not appear to me probable that the second oil, of which I have spoken above, is eupione. When the point of ebullition,  $47^{\circ}$  of this last, is compared with that of the other, which is  $225^{\circ}$ , it is obvious that there must exist a remarkable amount of impurity, even should these liquids be the same. At the same time, I must avow, that I have obtained during the past year, a certain quantity of a liquid which I regard as impure eupione, by treating the products of a distillation of caoutchouc, procured myself, with sulphuric acid. But this distillation did not afford an oil like that of Mr. Enderby.

M. Liebig also thinks that the other substances described by M. Reichenbach, are only the products of reaction, and do not exist in the pitch. But I may be permitted to remark, that the presence of creosote is detected in pitch as well as in pyroligneous acid, by its odour and by its antiseptic power; that paraffine can be purified in a considerable degree by rectification, and that M. Reichenbach has rendered it probable, in his last memoir upon eupione, that this substance can be extracted from the tar of oil, by complete rectification, and without the addition of any reagent. Be the fact as it may, the change produced upon the oil of caoutchouc by sulphuric acid, merits the attention of those who are engaged in studying the empyreumatic substances; without attaching importance to it as an example of isomery, the difficulty of purifying these products, is apparent.

*Journal de Pharmacie.*

## ART. LXI.—ACTION OF SULPHURIC ACID UPON OILS.

M. E. FREMY has examined the action of sulphuric acid upon olive and almond oils. These oils treated with half their weight of concentrated sulphuric acid, gave origin to four combinations, which the author designates under the names sulpho-stearic, sulpho-margaric, sulpho-oleic and sulpho-glyceric acids.

Sulpho-stearic and sulpho-margaric acids are decomposed by water, the first into sulphuric acid and a new one, hydro-stearic acid, the second into sulphuric and meta-margaric acids.

Hydro-stearic acid is white, soluble in alcohol and ether, and crystallizes into hard granular masses. Its composition can be represented by that of stearic acid, hydrated.

Meta-margaric acid is less soluble in alcohol than the preceding; it melts at  $49^{\circ}$ . In the salts, it is isomerical with margaric acid; but isolated, it contains more water.

Sulpho-oleic acid is soluble in alcohol and water, but the aqueous solution is slowly decomposed at the ordinary temperature. It is instantaneously decomposed at  $100^{\circ}$ ; affording sulphuric acid, and a new one, hydro-oleic acid, the composition of which is represented by that of oleic acid, hydrated.

Hydro-oleic acid, submitted to heat, is transformed into water, carbonic acid and two hydrogenized carbonated liquids, *oléene* and *elæne*; they contain hydrogen and carbon in the same proportions as olefiant gas, but in a greater state of condensation. *Oléene* melts at  $55^{\circ}$ , and *elæne* at  $108^{\circ}$ . They both combine with chlorine.

*Journal de Pharmacie.*

## MINUTES OF THE COLLEGE OF PHARMACY.

Stated meeting held October 25, 1836, H. Troth, Vice President, in the chair.

The minutes of last stated meeting were read and adopted.

The committee appointed on the revision of the old English Patent Medicine Directions, and for the purpose of having the same printed, are continued.

The following letter of resignation was read and adopted:

*"To the President and Members of the Philadelphia College of Pharmacy.*

"GENTLEMEN—I beg leave to tender my resignation as a member of the College, though in thus withdrawing from it, I trust that I shall never loose the deep interest I feel in its prosperity, and increased usefulness.

With sentiments of high regard and esteem, I am, &c.

R. EGLESFELD GRIFFITH.."

Specimens of the root, seeds and oil of the *Symplocarpus fœtidus*, were presented to the College by Joseph M. Turner, one of the graduates of the Institution.

The following resolution was laid on the table agreeably to the rule in that case:

"We propose Dr. Robert Eglesfeld Griffith, Professor of Materia Medica, in the University of Maryland, as a candidate for Honorary Membership in the College.

(Signed,) HENRY TROTH,  
WILLIAM HODGSON, Jr.  
CHARLES ELLIS.

Stated meeting held Nov. 29, 1836. The minutes of last meeting were read and adopted. The minutes of the Board of Trustees were read, from which the College is informed of the election to resident membership of Charles L. Heinitsh, and that the following gentlemen were duly elected associate members in this institution, viz.: *Flodoardo Howard*, of Washington city, D. C.: *George W. Merchant*, of Lockport,

New York; *Dr. Washington L. Atlee*, of Lancaster city, Pennsylvania.

Two vacancies having occurred in the Board of Trustees, William Biddle, and Edward Needles, were duly elected Trustees.

Resolved, that the College proceed to the election of Dr. Robert E. Griffith. Whereupon he was declared to be duly elected an Honorary Member of this College.

The resignation of Edward Hopper was accepted, and he allowed to retain his certificate of membership, agreeably to his request.

Resolved, That during the continuance of the lectures, the meetings of this College be held on the evening of the day preceding that on which they were usually held.

Resolved, That the committee on patent medicine directions be authorized to have 300 reams printed, provided they obtain subscriptions sufficient to defray the expense.

Stated Meeting, December 26, 1836. The minutes of last meeting, and of the Board of Trustees, were read.

Dr. Joseph Carson having been recommended, at the last meeting of the Trustees, as a candidate for resident membership, the college proceeded to ballot; whereupon he was declared to be duly elected a resident member.

The resignation of Joseph Trimble was accepted.



### **PATENT MEDICINE DIRECTIONS.**

The Philadelphia College of Pharmacy having had under consideration the subject of revising the old English Patent Medicine Directions, have instructed their Committee to print an edition of three or four hundred reams.

These Directions, thus improved by the omission of exceptionable matter, are in progress of being printed, and may be obtained by application to the members of the College.



## MISCELLANY.



*Cause of Decrepitation* ; by M. BAUDRIMONT.—Most authors on this subject have attributed decrepitation to the vaporization of water contained between the laminae which compose the substance operated upon. This opinion not appearing to me well founded, I dried at a low temperature and by various means, different anhydrous substances capable of decrepitation, but found that notwithstanding the most perfect desiccation, they still decrepitated when suddenly heated. The tendency of the decrepitating body to a separation of its parts in the direction of its cleavage faces, leads me to the following conclusion : that decrepitation is owing principally to the bad conducting power of the several substances, the outer layers expanding by heat, without a corresponding internal expansion, and consequently splitting off with a kind of explosion. There are instances, however, in which the substance is volatile and for this reason decrepitates ; but this is not in general the case with decrepitable substances.

*American Journal of Science and Arts—and L'Institut, No. 158.*

*On Donium, a new substance discovered in Davidsonite* ; by Mr. THOMAS RICHARDSON.—The mineral Davidsonite was discovered by Dr. Davidson, of Aberdeen, in a marble quarry near that city. An analysis of it by Mr. T. Richardson, proves it to be composed of Silica and a base which Mr. R. supposes to be an oxyd of Donium. This oxyd is distinguished from the alkaline and earthy bases, and from several of the metallic ones, by the green precipitate which it gives with the sulph-hydrate of Ammonia; and its solubility in the caustic alkalies, and in carbonate of Ammonia, the light brown precipitate thrown down by sulphuretted hydrogen, and the green given by sulph-hydrate of ammonia, distinguish it from all the others.

The name Donium is a contraction of Aberdonia, the Latin name of Aberdeen, near which place Davidsonite occurs.

*Rec. of Gen. Sc., June, 1836.*

Since the publication of Mr. Richardson's paper descriptive of Donium, Dr. Bause, of Perzance, has announced that he has been examining for some time a new oxyd which turns out to be identical with that of Donium. We may soon expect a complete account of Donium and its compounds, from Dr. Thomson of Glasgow.

*Ibid and Ath. No. 452, June 25, 1836.*

*Tobacco, a remedy for Arsenic*, communicated to the Editor by Rev. RALPH EMERSON.—About the year 1820, Miss Sophia Eastman of Holles, N. H. (now connected with the orphan asylum in Troy, N. Y.) fell into the mistake so often committed, of eating a portion of arsenic which had been prepared for the destruction of rats. Painful symptoms soon led to inquiry; and her mistake was discovered. An elderly lady who was present, advised that she should be made to vomit as speedily as possible, and as she had always felt a perfect loathing for tobacco in every shape, it was supposed that this would at once effect the purpose. A pipe was used, but without producing any nausea. She next chewed a large portion of strong tobacco, and swallowed the juice, and that without even a sensation of disgust. A strong decoction was then made with hot water of which she drank perhaps half a pint. Still there was neither nausea or dizziness, nor did it operate at all either as an *emetic* or a *cathartic*. The painful sensations at her stomach, however, subsided, and she began to feel well. On the arrival of physicians, an emetic of blue vitriol was administered, which operated moderately once. One or two days after, there was a discharge of a dark green color, approaching to black. No ill consequences followed.

Another case occurred in the same place, a few years subsequent, in which arsenic was taken through mistake, by a sick person, and she employed tobacco with the like success. She, too, had always loathed the article, but now chewed it and swallowed the saliva, without producing sickness at the stomach. No emetic was administered in this case, nor any other remedy. Happy will it be for our race, should this insidious poison, now the slow death of so many, be employed only as an antagonist to those other deadly poisons, for which it may have been provided by the Creator, as a sure and speedy remedy.

The above facts I lately received from Dr. Eastman, of Holles, the father of Sophia, and from her sister, at whose house Sophia committed the mistake.

Yours truly,

RALPH EMERSON.

Andover, Mass. May 26, 1836.

*American Journal of Science and Art.*

*Sulphate of Baryta in Calomel*.—M. Moritz, of Strasburg, has published the fact, that in a quantity of protochloride of mercury, manufactured in Paris, and obtained by him from that place, he discovered an admixture of sulphate of baryta. The article was exceedingly beautiful, and free from corrosive sublimate. Submitted to the action of heat, it only became volatilized in part. The experiment was repeated in a tube closed at one extremity. The quantity used was a gramme, which left as a residue, a white impalpable powder, unaffected by heat, insoluble in water and the mineral acids, and which was recognised to be the above salt. Its weight was five decigrammes.

*Journal de Pharmacie.*

*Researches into the Nature and Properties of the Compound formed by Albumen and the Bichloride of Mercury.*—When albumen mixed with water is added to a solution of corrosive sublimate, a precipitate is obtained which no longer possesses the poisonous properties of the latter, as has been proved by M. Orfila: With regard to the composition of this precipitate, however, chemists are still undetermined. Some authors consider it as a combination of the protochloride of mercury, with the altered albumen.

M. Lassaigne, on the contrary, concludes from his experiments, 1. That the albumen and fibrine unite with the corrosive sublimate without decomposing it. 2. That the insoluble compounds which result from this combination, are soluble in the chlorides, bromides and iodides of the alkaline metals; which circumstance should induce those who administer albumen as an antidote to corrosive sublimate, to bring about a speedy evacuation of the compound formed, in order to avoid the risk of a re-resolution of it, by the chloride of sodium contained in the stomach. 3. That in the compound thus formed, 10 atoms of albumen are combined with 1 atom of bichloride of mercury, or albumen, 93.55; bichloride, 6.45. 4. That in the preservation of animal substances by corrosive sublimate, a similar combination takes place between this salt and the albumen and fibrine of the organic tissue.

*Journal de Chemie Medicale.*

*Deaths from Morison's Pills.*—Our late English journals contain a number of cases in which death has followed the administration of this quack panacea. One of the agents of Morison, a certain Frederick Salmon, was tried in April last for manslaughter, and convicted; but recommended by the jury to mercy, as he was not the compounder but vender only of the pills. He was nevertheless sentenced to pay a fine of 200*l.*, (about 900 dollars,) and to be confined in Newgate until the same be paid. A report of the trial, with the sentence of the Recorder, is contained in the London Medical Gazette of April 9th and 10th last.

*Amer. Jour. Med. Sci.*

*Adulteration of White Lead.*—The large quantities of sulphate of barytes imported into France, principally for the purpose of mixing with white lead, has induced us to point out the mode in which this adulteration can be detected, and the relative proportions of the two articles determined.

This method is based on the solubility of carbonate of lead in nitric acid, and the insolubility of the barytic salt in the same menstruum. One hundred parts of the white lead suspected to contain barytes, is to be finely pulverized and dried; the latter precaution is necessary, as what is termed dry white lead contains more or less moisture; from actual experiments made in 1835 on six different specimens, it was found that one contained  $\frac{4}{100}$  of water, two  $\frac{5}{100}$ , two  $\frac{6}{100}$ , and one  $\frac{7}{100}$ . The dried lead is then

to be introduced into a matrass, and nitric acid diluted with half its weight of water gradually added, till the whole that is soluble is taken up by the acid. After the acid has ceased acting, the mixture is to be left to settle, the clear liquid poured off, and the residue, if any, washed with pure water, dried and weighed; its weight indicates the portion of insoluble matters mixed with the lead.

This method has proved to us, 1st. That even the pure white leads leave a residue which may vary from  $\frac{1}{2}$  to 1 per cent.; this residue is siliceous, and probably arises from the wearing away of the mill stones used in grinding the lead; 2d, that other white leads contained from  $\frac{19}{100}$  to  $\frac{20}{100}$  of insoluble matters; this was principally sulphate of barytes. It is even probable that this proportion is much higher in the common white lead of commerce. M. Robiquet, in the article *Ceruse*, (*Dict. Technologique*, iv. 29,) states some of the proportions in which white lead is adulterated with this article. He says, that in Germany, what is called Venice white (*Venesianer weiss*) is formed of equal parts of carbonate of lead and sulphate of barytes; that Hamburg white (*Hamburger weiss*) is composed of three parts of sulphate of barytes, and one part of carbonate of lead; Holland white (*Hollander weiss*) of the same proportions, and that another but inferior article, also called Holland white, contains seven parts of barytes to one of lead.

*Jour. de Con. Usuelles.*

*Leaves of the Grape used as Moxa.*—M. Bridel, of Bleu, has proposed the employment of the leaves of the common grape, (*Vitis vinifera*), as a substitute for the down of the *Artemesia chinensis* in the manufacture of moxa, of which these articles are usually fabricated. The following is the mode of preparation:

At the end of autumn, when the frost has caused the fall of the leaves, and they are somewhat withered, they are collected and thoroughly dried in an oven at a moderate heat; they are then beaten in a mortar until a soft cottony mass is obtained. To secure the down which results from this simple operation, they are enclosed in tight boxes, and kept in a dry place. This down is used to make the moxa in the same way as that of the *Artemesia*, and answers all the purposes as well.

*Formula for the internal administration of Iron.* By MEURER.—The following formula, though much recommended by chemists, has been little employed in medicine. It is an advantageous substitute for chalybeate waters, which are less efficacious than it, and much more expensive:—  
 R. Sulph. ferri chryst. ʒss., sacch. alb. ʒiss., tere simul et divid. in chart. xii.  
 R. Bicarb. sodæ ʒss., sacch. alb. ʒiss., tere simul et divid. in chart. xii.  
 Dissolve one packet of each separately in water, mix, and let it be

taken as an effervescing draught. The decomposition is as follows; 1st, carbonate of the protoxide of iron; 2nd, sulphate of soda; 3d, a little undecomposed carbonate of soda, the quantity of bicarbonate being more than sufficient for the decomposition of the sulphate of iron.—*Amer. Jour. Med. Sci.*—*Dublin Jour.* from *Summarium des Neuesten in der Heilkunde*.

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BATTLEY'S *Liquor opii Sedativus* and *Liquor Cinchonæ*.—This preparation, which has been made according to a secret formula for many years, is said to be formed simply by *macerating opium in distilled water* for a given time at an equable and gentle temperature (that of the laboratory,) with free access of light and air. About a seventh part of alcohol is added at the end of the process, in order to preserve the liquor.

Mr. Battley's "*Liquor Cinchonæ*" is prepared by macerating seven pounds of coarsely-powdered bark in seven gallons of distilled water for 24 hours, straining, and evaporating, to a certain extent, in wedgwood dishes. About four ounces of spirit may be added to preserve the liquid. It is said to be a preparation equal to quinin: seven or eight drops are a sufficient dose.

*American Journal of Medical Sciences, and Lancet.*

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On *Pharmaceutical Preparations*.—Dr. ROBERT D. THOMSON exhibited to the Westminster Medical Society (March 26th 1836) several specimens of vegetable concentrated extracts, which were prepared by careful attention to the nature of the elements which entered into their composition. He remarked, that in regard to extracts, it is an important object to reject all those parts which have no action upon the animal system. For example, in the *extract of conium*, the only constituents which can possess any remedial agency, are *extractive* or *tannic acid* (both of which names are applied to substances possessing identical properties,) and the oxide of *CONEINE*. But tannic acid readily decomposes under particular circumstances, as by exposure to the air, when saturated with moisture, and is then converted into a different substance, *ulmine* or *ulmic acid*, possessing different properties. The principle *conceine*, in which the narcotic properties of the *conium maculatum* reside, is a colourless oil, but when exposed to the atmosphere, it is changed into a green resin, which imparts its colour to the extract. Hence a good green colour is a test of the genuine nature of this extract, if proceeding from the proper colouring matter, and hence a spurious extract is too often introduced into apothecaries' shops, which is coloured by means of salts or copper. The specimens of this extract before the Society, possessed the green colour of the oxide of *conceine* in perfection, and after having been kept for two years, was as perfect as when first formed, and not a trace of copper could be detected by appropriate tests. It was double the strength of the common extract of the shops, a dose consisting of two grains and a half. The specimen of

extract of *hyoscyamus*, also exhibited, had been preserved for a similar period, without being in the slightest degree impaired, either in appearance, chemical properties, or narcotic effects. Solubility is a test of the purity of this extract. Its dose is two grains and a half.

Dr. THOMSON called the attention of the Society to a new preparation, the *kinate of quinin*, from the *cinchona cordifolia*, in which the quinin, instead of being in combination with sulphuric acid, as in the form in which that medicine is usually administered, is retained in union with its native acid, and presented in the same form in which it exists in bark. The aromatic and astringent principles of the bark are also retained in this preparation, so that it actually comprises in a concentrated form all the active principles of the bark. It is pale yellow, quite soluble in water, and in doses of five grains forms a more powerful remedial agent than sulphate of quinin. Dr. T. observed, that in favour of the employment of this remedy, he might state that in the course of his experience in China, he had found bark much more effective in the cure of intermittent fever than sulphate of quinin, showing that the astringent principles of bark possessed a powerful influence on the human constitution. The great objection, however, to the use of the bark, is its bulky form. This objection is remedied by the *kinate of quinin*, which, from numerous trials, has been proved to possess fully the properties of bark.

*American Journal of Medical Sciences.—Ib.*

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*Purgative without Nauseous Taste.*—The following preparation is said to possess a quality much desiderated in purgative medicines, it not being offensive to the taste. R. Fol. sennæ, ʒij., Aq. font. f. ʒviiiij. Infuse during ten or twelve hours in a covered vessel; then strain and make a cup of common coffee with this infusion, to which one-third milk is to be added. This purgative coffee may be taken without any disagreeable taste being perceptible. M. Baudelocque has experimented a number of times at the children's hospital, with this preparation, and it has constantly produced from two to six stools in the twenty-four hours, and does not occasion either griping, vomiting, or intestinal irritation.

*Amer. Jour. of Med. Sciences.—Bulletin de Therapeutique, 1835.*

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*Dangers from Certain Cosmetics.*—The public seem not to be sufficiently aware of the danger incurred by the use of many of the cosmetics sold for dying the hair. One of the numbers of the *Annales d'Hygiene et de Med. légale* of last year, contains some interesting cases in which very disastrous effects followed the employment of these preparations. A young lady of 18, who used the powder of iris (*Iris germanica*) to her hair, was attacked with convulsions and delirium, from which she did not entirely recover for three months. Two similar cases were communicated to the Academy of Medicine by M. Aumont.

M. Deleschamp has recorded in the *Journ. de Chem. Med.*, t. vii., the case of a young lady who resorted to the Persian Wash\* to dye her hair black. The result was that her hair was not entirely blackened, but many parts of her skin took this colour, and the lady became a prey to headaches.

Butini asserts that he has known acute meningitis caused by the nitrate of silver applied to the hair.

*American Journal of the Med. Sciences.*

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*Pectic acid in gentian.*—M. Bussy took 8 ounces of the root of the *Gentiana lutea* in rough powder, and poured over it 8 ounces of pure water. In a quarter of an hour, he placed the powder thus moistened in a suitable apparatus. He then poured pure water over it in small portions at a time, taking the precaution not to add any more until the first was absorbed. In the course of a few minutes, a very deep brown liquid, of a thick consistence and transparent aspect, strained through into the receiver. He continued the washing until he had obtained 12 ounces of the liquid; when the colour became less deep, he changed the receiver and continued the washing, for which purpose 3 kilogrammes of water were employed. The powder possessed then an insipid taste and slight colour. In 12 hours, the liquid in the first receiver had acquired the consistence of very firm jelly. It was completely soluble in a solution of carbonate of potash. From this solution it was precipitated in the form of a jelly by alcohol, sugar, &c., shewing that it was pectic acid. Bussy subsequently extracted it from gentian by the same process, followed by Braconnet in separating it from carrots. He suggests that the pectate of Soda in solution may be substituted for eggs in clarifying sugar, and for gelatin in clearing wine, &c.—*American Journal of the Med. Sciences, and Journ. de Pharm.*, June, 1836.

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*Congelation of Mercury by Natural Cold.*—*Extracts from a minute of observations on freezing Mercury in the open air, made at Gardiner, Maine, January 28th and 29th, 1817.*—The whole of the day of the 28th, was intensely cold. At 2, P. M. the thermometer hanging on the wall of a house stood at  $-6^{\circ}$ . About sunset the wind subsided.

A tray of charcoal was placed upon the end of a wharf projecting into the Kenebeck, nearly a hundred yards from any building or other elevated object. On this was placed a thermometer in a blackened tin case, and two phials each containing a small quantity of mercury, the lower half of each phial being blackened, and the phial a little raised from a horizontal position, so that the fluid might be within the blackened part. A similar phial of mercury was placed on the snow at a little distance; but as it underwent no change, no farther notice was taken of it.

\* This is a solution of 10 grs. nit. argent. in one oz. of water.

At 10 o'clock in the evening, the thermometer stood at  $-29^{\circ}$ . The sky was perfectly serene and clear. At half past 11, the thermometer had fallen to  $-32^{\circ}$ . At half past 3, (the 29th,) the thermometer was at  $-38^{\circ}$ ; the mercury in the phials of course still fluid. The atmosphere was remarkably transparent and perfectly calm. At half past 6, the thermometer stood at  $-40^{\circ}$ . It soon rose one degree while we were bending over to examine it—the mercury in the phials still fluid. I now poured out a small quantity of the mercury into an excavation in a piece of charcoal. At  $\frac{1}{4}$  before 7, the thermometer was again at  $-40^{\circ}$ ; the mercury in the phials still fluid; but that on the charcoal was partially congealed. As I examined it with a slender stick, it exhibited the appearance of a soft solid, separating into parts without running into globules; and the fragments were rough, and evidently crystalline. These appearances, however, continued only a short time; but while I was examining it, being of course necessarily bent over it, the whole soon returned to a perfectly fluid state. At 7 o'clock, the thermometer was still as before at  $-40^{\circ}$ . The mercury in the phials was unchanged. That on the piece of charcoal exhibited the same appearances as at the last observation, only in a less marked degree, and it sooner became fluid. Soon after this, the sun rose, and of course the attempt was discontinued.

TO PROF. SILLIMAN.—*Dear Sir*,—I send you above, the extract from my minutes of an observation of the effect of natural cold on mercury, on the Kenebeck. A few weeks later, having been supplied by the kindness of the late Mr. Vaughan with several excellent thermometers of Troughton's manufacture, I attempted to ascertain how much effect was attributable to the cooling of the surface by radiation, in a similar state of atmosphere: and on one occasion found a difference of 18 degrees between a thermometer on charcoal on the ground, and another suspended freely in the air, 18 or 20 feet above it—one being  $36^{\circ}$ , the other  $18^{\circ}$  below zero. This was in a clear night, and subsequently when clouds appeared, the difference diminished, until at the commencement of snow the two instruments agreed.

Yours very truly,

E. HALL, JR.

*Boston, Wednesday Evening, March 23, 1836.*

*Amer. Jour. Sci. & Art.*



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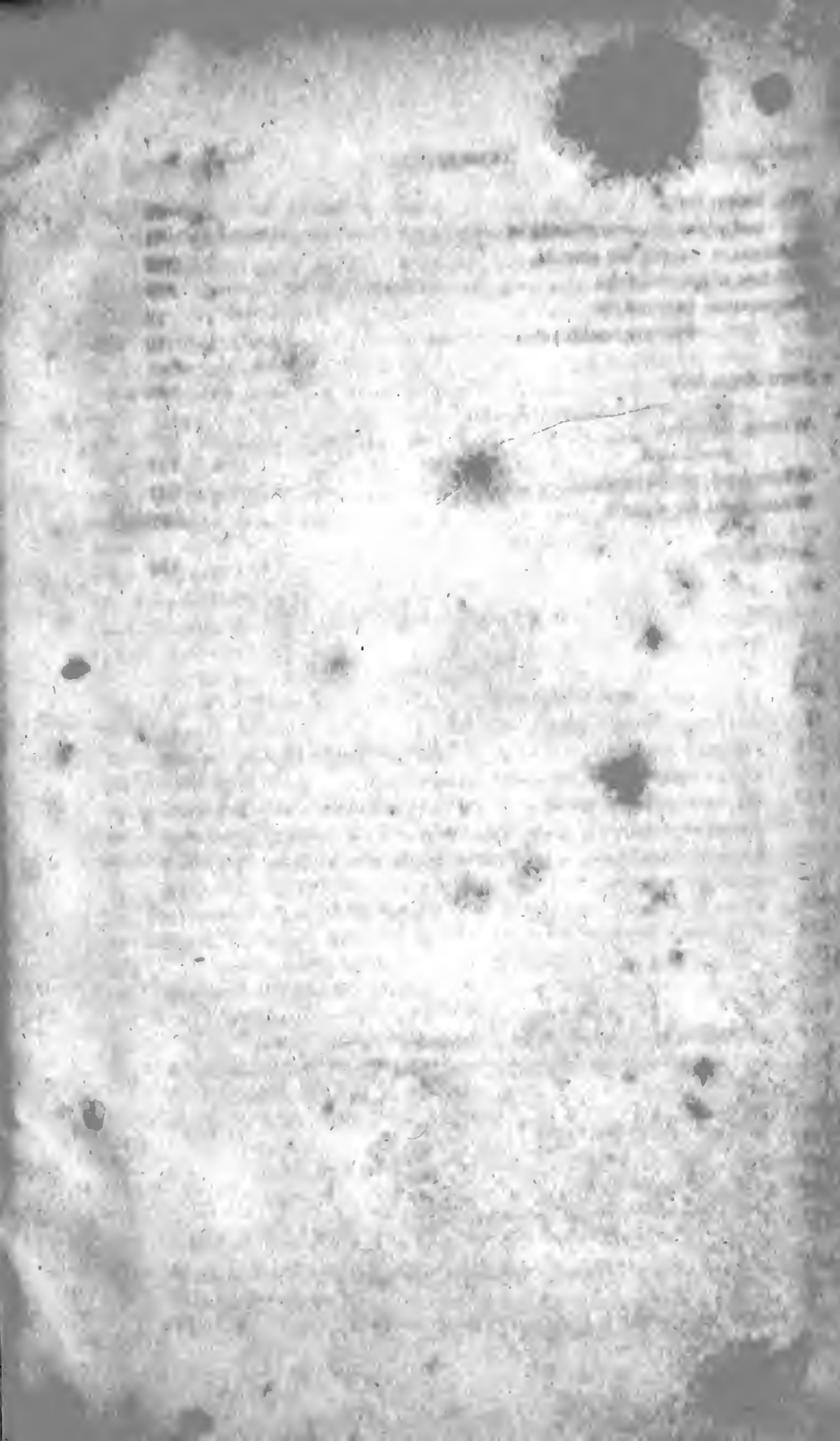
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